November, 1946 Vol. 35, No. 9

PERIODICAL

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

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DETROIT

The Shop Teachers' Professional Magazine

Color Dynamics
. . . Pittsburgh's system of using the energy in color reduces eye fatigue and absenteeism, lessens housekeeping problems, builds up morale and improves quality and efficiency of production.

Modern Vocational Schools Teach Students How to Use COLOR for Functional as Well as Decorative Purposes!

WHAT the skilled shopman of tomorrow knows must extend beyond metals, machines and methods. He will know how to use color for functional as well as decorative purposes in plant maintenance.

That's why many schools include Pittsburgh's COLOR DYNAMICS in their training courses.

In COLOR DYNAMICS, colors are classified according to their energy. *Focal* colors lessen eye fatigue and nervous tension. *Eye-rest* colors relax the eyes of the worker. *Morale-building* colors promote cheerfulness and restrain mental depression. *Safety* colors reduce accident hazards.

Begin now to teach this new science in your school. You can demonstrate its principles in a practical manner by painting one or two machines in your manual training class rooms.

Write today for a free copy of our book, "Color Dynamics." Packed with practical suggestions, it makes a fine textbook. Pittsburgh Plate Glass Company, Paint Division, Dept. IV-11, Pittsburgh 22, Pa.

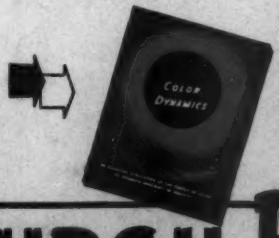
Paint RIGHT with Color Dynamics
Paint BEST with Pittsburgh Paints!

The benefits of COLOR DYNAMICS are made more enduring when you use Pittsburgh long-lasting quality paints. There's a Pittsburgh Paint for every need.

WALLHIDE—for one-day wall painting—available in three types:

PBX—gives extra durable finish which can be washed frequently without streaking or spotting; **SEMI-GLOSS**—for use where higher sheen is required; **FLAT**—a velvet-like finish, beautiful and restful, for offices, suites and dining rooms. These paints are enriched with *"Vitolized Oils"* for controlled penetration which keeps film *live,* tough and elastic.

WATERSPAR ENAMEL—for woodwork, furniture, or metal trim. Smooth, china-like gloss resists marring and abrasion.



FLORHID—for floor surfaces. Quick-drying, tough. Can be scrubbed frequently with soap solutions.

LAVAX MACHINERY ENAMEL—a tough, durable finish which is impervious to oil, grease, grime or dirt.

PITTSBURGH PAINTS

PITTSBURGH PLATE GLASS COMPANY, PITTSBURGH, PA.

PITTSBURGH STANDS FOR QUALITY PAINT AND GLASS

Basic Equipment for Basic Instruction

Western Michigan College of Education

SOUTH BEND LATHES

Basic instruction for student machinists centers around the lathe, the basic machine tool. No training equipment should be chosen with greater care and attention. Lathes selected for the modern vocational shop or school should be versatile, ruggedly built, precision tools; ease of operation and safety are other important qualities. They should have a wide range of spindle speeds for machining the many materials with which the student should be thoroughly familiar today. Above all, the lathes used for instruction should be as modern as those which industry uses.

On this basis, it is significant that batteries of South Bend Precision Lathes have been chosen, exclusively, for some of the largest, most modern vocational shops in the country. If you specify, approve or decide upon the equipment for your school or shop, we shall be glad to send you a copy of Catalog 100 showing, in color, all types and sizes of South Bend Precision Lathes.

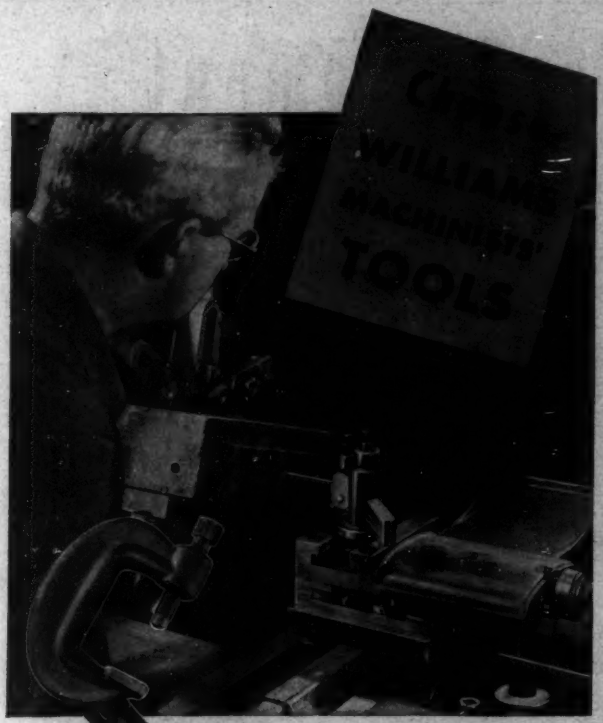
SEND FOR THIS BOOK

Here is a book that will give you many ideas, as well as practical assistance, for planning your modern school shop. It shows many installations of South Bend Lathes in well known vocational schools. Ask for a copy of "Modern School Shops."

LATHE BUILDERS SINCE 1906

SOUTH BEND LATHE WORKS

466 EAST MADISON STREET • • • SOUTH BEND 22, INDIANA



Whether beginner or old-timer, a machinist is only as good as his tools. Williams Tool Holders, Lathe Dogs, "C" and Strap Clamps are all drop-forged and produced with exacting skill to high standards of design and workmanship. There are no finer tools with which to learn or earn...sold by leading Industrial Distributors everywhere. Write Dept. I-1146 for descriptive literature.

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11. Data on "C" Clamps.
12. Use of Cutting-Off Tools.
13. Use of Knurling Tools.
14. External Thread Cutting.
15. Internal Thread Cutting.
16 to 21. Six Data Sheets on grinding cutters for Tool Holders.
22. Use of Open-end Wrenches.
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Students who learn soldering with Kester Flux-Filled Solders learn the clean, tight soldering job—the expert soldering requirements of industry.

Soldering the Kester Way results in fine, clean work that encourages the student, fits him for the actual job of industry. Kester Cored Solders reduce the art of soldering to a simple operation that is virtually mistake-proof. Scientifically balanced with superior alloys, the self-contained flux in the core of Kester Solders eliminates the chance of uneven proportion, unequal heating. The necessity for messy flux pots is removed and equipment-marring splatters are minimized wherever Kester solders are used.

The finest top quality solders in correctly compounded combinations have identified Kester Cored Solders for more than 47 years. Write your supply house for Kester Rosin-Core solder for electrical work, Kester Acid-Core Solder for general work. Kester Solders are your assurance of the best results in solder training.

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Eastern Plant: Newark, N. J.
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KESTER
FLUX-FILLED SOLDER

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, November, 1946, Volume 35, No. 9. Published monthly, except during July and August, by The Bruce Publishing Co., Milwaukee 1, Wis. Entered as Second-Class Matter January 2, 1914, at the Post Office at Milwaukee 1, Wis., under the act of March 3, 1879. Subscription price in the U. S., Canada, and countries of the Pan-American Union, $2.50 per year; Foreign, $3.00; Single copies, 35 cents.

Turns Out Factory-Accurate Work!

Gives Students Realistic Training!

YOUR STUDENTS WILL BE BETTER MECHANICS WITH VIBRO-CENTRIC* VALVE SEAT GRINDERS

There's a big demand for valve seat grinding on all kinds of engines . . . and using Black & Decker Valve Seat Grinders is the best way to train your students in the fast, accurate way of handling these jobs! With this tool, you'll be better equipped to teach factory precision work on automobile, truck, tractor, aircraft, marine and Diesel engines. Here's why:

Vibro-Centric Is Fastest Because: (1) Gruv-Tòp® Pilots center themselves automatically, compensate for worn guides without lost time or motion; (2) Full-Powered Driver grinds at top speed—only a few seconds per seat; (3) Built-in Vibrating Action reduces stone loading and stone wear.

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Send for our free, illustrated handbook —"The Principles of Valve Reconditioning" — containing many helpful pointers on correcting valve assembly troubles in internal combustion engines. For a copy, address: The Black & Decker Mfg. Co., 680 Pennsylvania Ave., Towson 4, Md. For help on any tooling problem, see your nearby Black & Decker Distributor.

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FOR SHARPER SHOP TOOLS

Three distinctive qualities commend Norton Abrasives Oilstones for improved sharpening of shop tools: (1) factory oil-filling, (2) complete selection range of both natural and electric furnace abrasives, (3) reputation for continued excellence sired in the "Pike" craft-tested tradition since 1823. Factory oil-filling retards glazing and speeds up cutting action. Complete selection range insures greater choice from the coarsest vitrified stones to the surgical fineness of quarried Arkansas mineral. Reputation for excellence guarantees full-value service.

For faster-cutting shop oilstones, Norton Abrasives offer four celebrated brands:

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Aluminum oxide, oil-filled

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Natural Novaculite, hard and soft

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Write for Wall Chart "Industry's Oilstones"

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● BERNARD Hand tools are widely used in industry and in the schools because of their unique and practicable design. For complete, free catalogue please use coupon.

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Sirs: Please send me your catalogue of pliers, nippers, punches, and other specialized tools suitable for the industrial classroom.

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Rubyfluid Paste and Liquid Soldering Flux is easier for the student to use. It wets out freely and properly prepares metal to give solder a firm hold—produces strong neat unions every time. Will not corrode metal—has no harmful or objectionable fumes.

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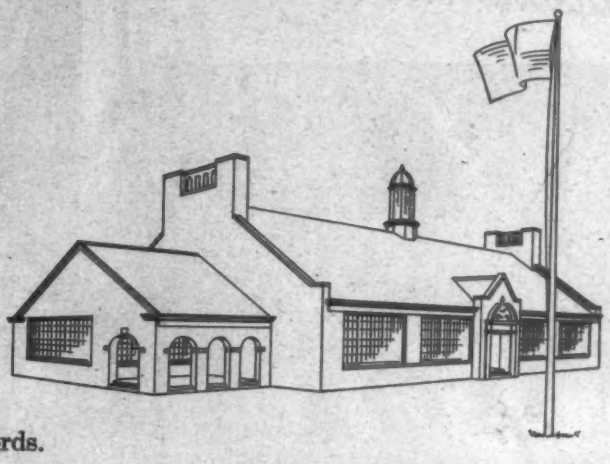
Rubyfluid

A School and its Duplicator



We visited a school the other day.

It had a projector.

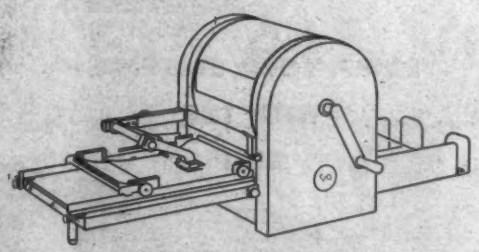
It had a fine phonograph and lots of records.

Many of the teachers had advanced degrees and spent their summers studying how to be better teachers.

Then we looked at the school's duplicating equipment.

It was made in 1914.

"But this is 1946," we said. "Isn't it time you had a new, modern Mimeograph brand duplicator, as up-to-date as your teaching methods?"



The teachers got the point right away.

They know how the Mimeograph brand duplicator produces lesson materials which help children retain what they see and hear.

They want each pupil to have his own copy of text materials, even when books are scarce or not available at all, even though classes are bigger and classrooms more crowded than ever.

And teachers know, too, how easy it is to turn out black-and-white, sight-protecting copies of high visibility with the Mimeograph brand duplicator and Mimeograph brand supplies. Easy to use color, easy to make pictures, too.

If your school needs a new Mimeograph brand duplicator, now is the time to find out how this wonderful machine lightens the teaching burden, shortens the teaching day.

A complete line is now available.

Call the Mimeograph distributor in your community, or write A. B. DICK COMPANY, 720 West Jackson Boulevard, Chicago 6, Ill.

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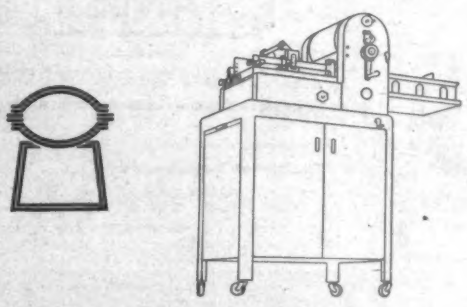

Mimeograph brand duplicator

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Here's a tool for metal-working that your vocational students as future artisans should know how to use. With the Stanley Unishear, they can make quick work of cutting sheet metal for shelving, racks, signs, machine guards, templates, metal boxes, radiator covers, etc. Zips through steel up to 14 gauge, linoleum, canvas, asbestos, sheet insulation, hardware cloth, etc. . . . at 15-20 feet per minute. Cuts to hair-line accuracy on curves, angles, straight lines . . . inside or outside. Safer and easier to handle than hand snips. Blades readily adjusted and removable for sharpening. Strong, durable—requires minimum attention. A typical Stanley Electric Tool.

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AN INDUSTRIAL TOOL THAT MEETS ALL VOCATIONAL NEEDS

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Atlas shapers, like the other Atlas tools, are priced within reach of limited budgets. Send for copy of the latest Atlas catalog with complete specifications of the Atlas 4 Tool Team — plus school shop equipment recommendations.

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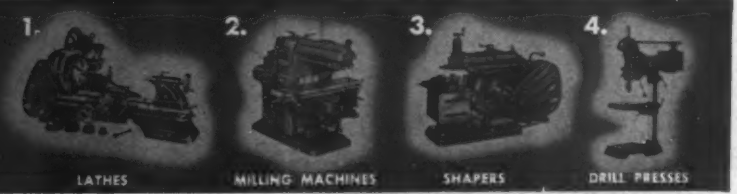
Atlas 4 TOOL TEAM FOR SMALL-PARTS MACHINING



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Until students have *actually worked with* these swift, versatile, modern tools, they can have no comprehension of the vast difference such tools make in speed, good workmanship, high earning power. Tools that are the accepted standard throughout industry... *the choice of better mechanics everywhere* . . . are the logical choice for the training of the productive craftsmen of the future. To vocational schools throughout America, Snap-on offers the services and counsel of tool experts located in principal cities from coast to coast. We will gladly send the Snap-on catalog of 3,000 hand and power tools on request. Address,

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THE CHOICE OF BETTER MECHANICS

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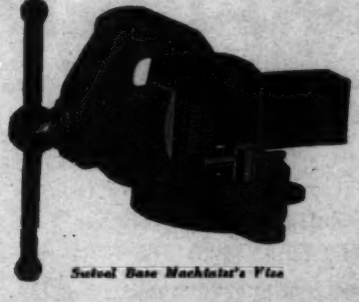

Swivel Base Machinist's Vise

Today more than any other time, getting the most and best results is the important thing. In all of your school shops vises play an important part in the training of men and boys who learn by doing. Be sure your woodworking, metalworking shops are Morgan Vise equipped because this will mean many years of satisfactory, trouble-free service.

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TURRET LATHE AND SCREW MACHINE TOOLS

Today, America Needs TURRET LATHE and SCREW MACHINE OPERATORS

The transition from tooling-up to all-out production has increased the need for turret lathe and screw machine operators. When preparing your courses to help fill this need it would be well to build them around ARMSTRONG TURRET LATHE and SCREW MACHINE TOOLS. These are provided for the basic operations, and take standard drills and knurls or cutters that anyone can quickly grind from stock shapes of high speed steel. Permanent, multiple-purpose tools, they reduce tooling-up to the selection of cutters, adjustment for clearance and tightening of set screws.

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Young men who qualify for sheet metal fabrication on PEXTO Machines will find them wherever they go to practice their chosen vocation.

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TODAY, a substantial proportion of Douglas fir plywood production is allocated by order of the Civilian Production Administration to the Reconversion Housing Program. Housing contractors, stock cabinet manufacturers, prefabricators and distributors **must** be supplied first — and this means a temporary shortage for all other industrial and construction users. But MORE plywood is being produced today than in pre-war years. When the present demand is met, an increased supply will be readily available. So — anticipate your needs as far in advance as possible. Keep in touch with your regular source of supply!

DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Washington

DOUGLAS FIR PLYWOOD
LARGE. LIGHT. STRONG.
Real Wood PANELS

These "Grade Trade-Marks" Are Your Assurance of Uniform Quality Standards

There is a type and grade of Douglas fir plywood for every building need. Each MUST meet rigid performance tests — in the field and in the Douglas Fir Plywood Association Laboratory. Choose the type you need by these "Grade Trade-Marks" — stamped on every panel.

EXT.-D.F.P.A.

EXTERIOR-TYPE plywood is made with completely waterproof synthetic resin binder especially for permanent exposure to weather and water. It is widely used for building exteriors, for outdoor signs, for railroad car siding, and in all phases of marine construction.

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PLYSCORD is an unsanded utility panel of unusual rigidity, made to withstand the rigorous service demanded of wall and roof sheathing and of sub-flooring.

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PLYWALL is the grade of interior-type plywood made for use where only one side is exposed, as in wall panelling. It is suitable for most stained finishes, for painting or papering.

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Announcing

The 1947 SHOP ANNUAL of

Industrial Arts and Vocational Education

The authoritative source of information and guidance in organizing, planning, and equipping school shops.

READY FEBRUARY 15, 1947

The SHOP ANNUAL NUMBER summarizes the periodic progress in the field of industrial arts and vocational education, emphasizes the new developments ahead, presents through actual shop layouts and equipment lists, the best methods of accomplishment in the school shop field. The service of the SCHOOL SHOP ANNUAL NUMBER (regular March issue) of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is

1. **It renders a comprehensive service promoting the introduction, progress, and expansion of industrial arts and vocational education.**

2. **It provides an authoritative source of information and guidance in organizing, planning, and equipping school shops.**

Single Copies, Shop Annual Number, $1.00
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THE BRUCE PUBLISHING COMPANY
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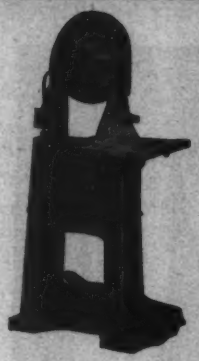
NEW YORK **CHICAGO**

WALLACE
"MACHINE-OF-THE-MONTH"



No. 16 Bandsaw

16" diameter wheels. 8" capacity under guide. Standard wheel speed, 1100 r.p.m. Blade speed, 4600 feet per minute. Geared motors, direct-connected 1 and 2 h.p. Built-in light. Net weight, 335 lbs.

For fine cabinet and furniture work, the Wallace No. 16 Bandsaw has no equal.

Geared motors step up wheel speed,—permit faster, smoother and easier cutting. Dynamically balanced wheels make blade breakage miserly.

Swivelling table, exclusive Wallace feature, permits use of rip fence for accurate resawing.

Write today for bulletins,—we also manufacture quality-built universal saws, jointers, lathes, mortisers, shapers, etc.

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Fine Plywoods
can double enthusiasm for Wood-Working Projects!

Your students will find an extra thrill in working with fine plywoods—Mahogany, Curly Birch, Bird's Eye Maple, Haveltol They'll put more interest and care into their work—take extra pride in the added beauty of the finished project.

We have available a complete stock of fine plywoods in many standard thicknesses, and in a variety of panel and cabinet grade sizes especially suited for the school workshop. Send today for complete catalog of plywood and craftsmen supplies.

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1 SCREW DRIVER does the work of 3

MILLERS FALLS
Automatics make teaching easier

With only one screw driver — a Millers Falls Spiral Ratchet — your students can do *any* screw driving job quickly and easily. Millers Falls Automatics can be used as regular rigid screw drivers, as right-or left-hand ratchets, or as complete automatics, to either drive or draw screws. Changes are made simply by shifting the knurled control sleeve and the spiral lock nut.

Velvet-smooth, powerful action and tested dependability are built into Millers Falls Automatic Screw Drivers. Their wide range of usefulness will make your teaching job many times easier. Ask your supplier to show you these fine Millers Falls tools.

One Thing in Common — *Quality!*

MILLERS FALLS TOOLS SINCE 1868

MILLERS FALLS COMPANY
GREENFIELD, MASSACHUSETTS

HE'S LOOKING FOR BUGS

He's hoping, of course, that he doesn't find any. Because in the manufacture of files, the best way to keep out "bugs" (defects) is to keep looking for them. Nicholson inspectors do that endlessly—through scores of inspections, tests and precautions. They begin with the scrutinizing of every batch of steel and continue down to the "ringing" test for soundness and a final check on the appearance of every finished Nicholson or Black Diamond file.

The inspection pictured above is a "spot" examination, through a hand magnifying glass, of a file that has just come from the cutting machine. Its purpose is to make sure that the file's teeth are properly raised and correct in shape for the kind of filing job they are to do.

It is "eternal vigilance" like this that helps to maintain the Nicholson high standard of quality and uniformity, and enables Nicholson to guarantee *Twelve perfect files in every dozen.*

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Dick Ernesti

Some of the early pioneers in art and in the industrial arts came into American schoolwork with the background of European education and a great variety of social developments. Our American contemporaries respected them highly and gave them every opportunity for expansion and growth. A chapter in the history of American education might be written about the early pioneers in the fine and industrial arts with English, German, and Scandinavian backgrounds.

Dick Ernesti died in Seattle, Wash., the other day and he died the artist who had always dreamed dreams of high ideals. Colorado was the richer in its day for the taste and the quality which the supervisor of art brought from his native Germany. The Western Arts Association accepted Dick Ernesti as a man of sincere purpose and an artist of no mean quality.

Dick Ernesti was a pioneer and he made the contribution of a pioneer. He came with high standards of art appreciation and he attempted to translate these into our American program of education. He succeeded in so far as all our education in America has found expression in an integration of art in the lives of children and in the industrial arts. Someday the historian will evaluate the contribution of Dick Ernesti and there will be splendid high lights and interesting overtones with warmth of color and expression.

— Frank Bruce

This Month's Cover

The cover picture this month shows a U. S. Forest Service picture of a timber scaler at Putnam Pond, Charlton Township, measuring the diameter of a log. Timber scaling is an important item in logging operations, and some of these scalers become very expert in determining the quantity of lumber contained in a given pile of logs.

Coming Conventions

November 7–9. Wisconsin Education Association at Milwaukee, Wis. O. H. Plenzke, secretary, 404 Insurance Bldg., Madison, Wis.

November 7–9. Wisconsin Industrial Arts Association at Milwaukee, Wis. H. J. Shufelt, secretary, City Hall, Racine, Wis.

November 29. Virginia Vocational Association at Richmond, Va. Headquarters, John Marshall Hotel. Miss Nettie Yowell, secretary, State Dept. of Education, Richmond, Va.

December 4–7. American Vocational Association at St. Louis, Mo. L. H. Dennis, 1010 Vermont Ave. S.W., Washington, D. C., in charge.

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Moral and Legal Aspects of Safety Education

*Jesse E. Rathbun**

The rapid expansion of the industrial-arts program within the past two decades is ample proof that the problem of safety education has been met to the satisfaction of school officials, parents, and the public at large. Statistics will verify the fact that the shop is one of the safest places in the school, or in the community for that matter. There are more serious injuries in the home or on the school playground than in the school shop. It is a matter of common knowledge that school stairways are more hazardous than school shops. This may be due to the fact that the shops are subjected to a continuous safety program and constant supervision, but the fact remains that the shop is by no means the greatest danger spot in the school. Fortunately the shop teacher can start safety instruction from the point of view of a safe shop and work toward the objective of maintaining a safe shop.

There are two major responsibilities involved in the question of purpose, relative to safety instruction; namely, moral and legal responsibility. Teaching safety in a complete and thorough manner to every pupil in the shop, and the maintenance of a safe working situation, discharges the moral responsibility, but the teacher must go further than maintaining a clear conscience in order to insure legal immunity. The primary purpose of safety instruction is to insure safety and prevent injury. The legal aspect of safety education does not become actively involved until and unless an accident occurs; nevertheless, in the eyes of the public, the shop teacher cannot defend himself morally if he cannot defend himself legally.

The legal aspect of safety education can become very involved due to the fact that unpredictable possibilities are likely to be encountered in legal entanglements. One would not suspect that the honest and conscientious teacher could be held legally responsible for an injury received by a careless, negligent boy, until after one has studied the ramifications of the legal problems involved. It is comforting to know that if, through thorough instruction, accidents can be avoided, legal action will never be confronted, but accidents are accidents because they come without warning or any immediate foresight. Accidents have happened, and accidents will continue to happen, but where and to whom is a question that cannot be answered. There is only one safe plan to adopt in dealing with the question of legal responsibility for shop accidents, and that is to prepare for them in advance. Such procedure may seem to reflect an attitude of pessimism and defeatism, but the alert shop teacher prepares for all eventualities and enjoys his optimistic view with a certain amount of security. Every teacher might well ask himself the question, "Am I prepared for an accident?"

The question naturally arises, how can one prepare for accidents in advance? From the legal point of view the shop teacher in the public schools of most states cannot be held directly responsible for shop injuries on any charge except that of negligence. In other words, the teacher and the school district are not legally responsible for the pupil while he is in school, but they are responsible for providing and maintaining a safe working situation into which the pupil can fit himself. The safe working situation includes safe equipment and adequate instruction to every pupil. This would seem to simplify the entire problem of legal responsibility, and no doubt would, if negligence could be interpreted and defined by law; however, no permanent interpretation of negligence can be established because each case stands apart from every other case and must receive individual interpretation. There are acts of negligence which are self-evident, and there are questionable acts where a decision on negligence would depend upon interpretation. The question of interpretation is the unknown factor in every legal case involving negligence. The interpretations and decisions in legal cases are often, if not always, made by laymen who may or may not be influenced by sympathy and other emotional tendencies. No doubt, one would feel safer if experts on legal questions could decide what constitutes an act of negligence. When legal action is taken against a teacher, it is not always a matter of whether or not he was negligent, but often one of whether or not he can give evidence showing that he was not. If the teacher has not prepared for a possible accident, he may easily find himself with nothing but his own testimony for defense. That the teacher's word alone is not sufficient to establish the fact that adequate safety instruction has been given is evidenced by the fact that in many of the cases where decisions have been against the teacher and the school district, the injured pupil has denied ever having received safety instruction. If the results of court procedure in the past are any criterion, it is evident that in so far as accidents in the school shop are concerned, an act of omission is an act of negligence.

The shop teacher cannot afford to depend upon his testimony alone for proof that safety instruction was given; he must have means of adequate proof that each and every boy has had sufficient safety instruction. Proof of safety instruction to the class does not provide proof that every boy has been taught, or that every boy has learned. The teacher must control the learning situation and have proof that every boy has qualified himself as a safe worker. Many conscientious teachers feel secure because there are printed rules and regulations to which reference can be made. Thorough instruction and printed rules do not meet the legal problems of safety in the schools. To be sure, they make up an important part of any safety program, but unless there is proof immediately available at all times that every individual understands them, the program is not complete from the legal point of view. To prepare for shop accidents the teacher must be prepared to prove beyond a doubt that his negligence was in no way responsible for the cause of the accident. To do this it is necessary for the teacher to have specific and detailed evidence that each boy has fulfilled the requirements specified in a given program.

The entire program of safety education must be based on the philosophy of prevention. The primary objective is to prevent injury to the pupil. In case of injury, the program must extend beyond the primary objective sufficiently to prevent a legal judgment against the teacher and the school district. Some of the large systems meet this problem by providing a form of one kind or another to which the pupil must affix his signature after the completion of certain specified requirements; however, many shop teachers are left to work out their own methods of providing proof that each pupil has had sufficient safety instruction. Regardless of whether or not the school system provides standard forms to all its teachers, every shop teacher should have some kind of written evidence,

*Vice-Principal, Portola Junior High School, San Francisco, Calif.

bearing the student's signature, that complete and thorough safety instruction has been given, and that the pupil participated in the safety program to his own satisfaction and to the satisfaction of the teacher. The method of arriving at this, or the type of form used, is of no great importance, but a minimum of essential points is necessary. The essential points in any such plan are as follows:

1. There must be written safety instructions which are available to the students at all times.
2. There must be proof that each student has studied the safety instructions.
3. The pupil should be tested by some form of written examination which bears the date and his signature.
4. The written examination should bear out evidence that the teacher has discussed all the safety regulations in the presence of the pupil.
5. There should be evidence in the written examination that the pupil is familiar with all the technical terms, machine parts, etc., that are used in the safety instructions and in the teacher's demonstration.
6. There should be an admission by the pupil to the effect that he has demonstrated his ability to use each machine in the presence of the teacher.
7. There should be a statement by the pupil to the effect that the teacher has demonstrated the use of each machine in the shop.
8. All tests and other forms of evidence of safety instruction should be kept on file as long as the pupil is in school.
9. In case of an accident, all evidence should be kept in a safe place until the injured person has reached legal age.
10. All material such as that suggested should be specific rather than general, and an individual record should be kept for each pupil rather than one record covering the program for an entire class or a group of pupils.

The first impression is that it is an endless task to keep detailed records for every pupil. The problem can be simplified by using the objective type test and a mimeographed form for the pupil to sign. A simple set of questions requiring "yes" or "no" answers will provide proof that the pupil at one time understood the safety regulations, provided the questions are comprehensive enough to cover all the important items. This type of objective test has been criticized on the ground that it will not stand up under legal attack because the pupil may have guessed the correct answers. Such criticism loses sight of the purpose of the evidence provided by the test. The purpose is to provide proof that the teacher has not been negligent in teaching safety.

A form stating certain facts which the pupil is required to sign before using machines is a very satisfactory method of providing proof that the pupil has completed the safety program. The advantage that the form has over a test is self-evident. The form does not eliminate the test, but it does provide a more exact statement of the extent of the work covered on a single sheet of paper, whereas a test requires two or more.

The following form is an example of what is being used in the safety program in a junior high school cabinet shop. It is believed that this plan has many merits which are self-evident. It will be noted that the pupil may qualify to operate any number of machines. For example, after fulfilling the general requirements, which are mentioned on the form, the pupil may qualify to operate one machine at a time. This is a very important point in view of the fact that a demonstration is necessary by both the teacher and the pupil. Wholesale demonstrations are eliminated because this form makes it possible for the pupil to wait until he has practical use for a machine before he asks for a demonstration, and he may wait until he can use his regular work to demonstrate his ability to operate the machine. Under this plan the pupil is not required to use all the machines before he can qualify to use one. Since it is understood by each pupil that he is not required to use any machine in the shop, it is significant that he does not have to demonstrate on every machine in order to qualify to operate one or two.

It is believed that the following form, with the accompanying test, covers all the essential points that are likely to arise in connection with placing legal responsibility for shop accidents.

Form Used in Safety Program in a Junior High School Shop

I have read the safety instructions regarding the operation of the following power-driven woodworking machines. I fully understand the importance of these rules and regulations, and I am aware that the violation of any one of them is likely to cause injury to myself or others.

(*Teacher's name*) has demonstrated to me the proper method of using each machine named in the following list, and has pointed out the danger of violating any of the *safety instructions*. He has taught me how to avoid injury by observing the *safety instructions* and using the machines properly.

I have demonstrated my ability to use each of the machines named in the following list in the presence of (*teacher's name*). I understand how to avoid injury through the proper use of the machine. I am confident that I can operate these machines without injury to myself or others.

(Name of each machine to be written in *by the pupil* only after he has completed his tests and other requirements regarding it.)

1. .....Date....Signature.....
2. .....Date....Signature.....
3. .....Date....Signature.....
4. .....Date....Signature.....
5. .....Date....Signature.....
6. .....Date....Signature.....
7. .....Date....Signature.....
8. .....Date....Signature.....

I have passed, 100 per cent, the written test covering the use of each of the above listed machines.

I hereby promise to observe the *safety instructions* and to follow the instructions given in the demonstrations.

I have read the above statements and I realize that my signature is proof that I have fulfilled all the requirements mentioned. I am not required to sign this statement. I may take woodwork and receive credit without using the machines. I understand that if I use a machine I do so at my own risk and because I wish to and not because I am required to.

Signature .....
Date .....

The foregoing form is used in conjunction with an objective test which covers conduct in the shop as well as all the safety instructions. The following sample questions, which are taken from the test, will serve to indicate the general nature of the form used.

SAFETY TEST

Name .....
Bench No. .....
Period ..... Grade.....

Directions: Write the proper answer in the parentheses. In most cases "yes" or "no" will answer the question. Do not guess.

( ) 1. Should you use any machine at any time without permission?
( ) 2. Are you allowed to make any adjustments when the machine is running?
( ) 3. Is anyone except the operator allowed inside the safety lines?
( ) 4. When operating the circular saw, are you allowed to push stock past the saw with your hands?
( ) 5. Are you familiar with all the machine parts that are mentioned in the *safety instructions* and in this test?
( ) 6. Has the teacher discussed with you or in your presence the safety instructions and why it is necessary to observe each?
( ) 7. When the operator is ready, should he allow another pupil to turn on the power?
( ) 8. What is the length of the shortest board that you are allowed to run over the jointer?
( ) 9. Are you allowed to talk to anyone while using a machine?
( ) 10. Have you studied all the *safety instructions?*

Signature .....
Date .....

Any number of questions can be included in the test without making it a laborious task to correct. It has been found that a set of questions for any one shop, when carefully selected, can be mimeographed on two sheets of standard-size paper, which provides space for a total of about 50 questions of this type.

An argument often used against this type of record is that the pupil cannot be legally obligated regardless of the method used. It is true that no agreement can be entered into with any pupil in the public schools which would tend to relieve the teacher of legal responsibility. Likewise, parents cannot sign a waiver relieving the teacher of legal responsibility in case of student injury. An all important point is the fact that there is no legal "out" in case the teacher is proved negligent. Then, the entire plan for legal protection must center around an effort to be prepared to prove beyond a doubt that negligence was not the cause of the accident. The pupil's own admission that he has been given complete and thorough instruction has no legal significance other than to provide convincing evidence that there is no question of negli-

gence on the part of the teacher. The pupil's own admission bearing out proof that the teacher has done everything within reason to promote safety is the best evidence that can be produced.

The question of negligence cannot be disposed of with providing means of adequate proof that safety instruction has been given to each pupil. There are conditions which, if allowed to exist in the shop, constitute an act of negligence. For example, if pupils are permitted to use unguarded machines, without question, the teacher is guilty of negligence. The difference between maintenance and instruction is that instruction must deal with individuals, and maintenance must deal with situations, because safe working conditions apply to all pupils. When working conditions are safe for the class as a whole, they are safe for every individual, but when the class as a whole has been given safety instruction it does not imply that every pupil has had sufficient safety instruction. Instruction and demonstrations must be witnessed by students as individuals, and the keeping of records of proof must apply to individuals.

Evidence in some shops leads one to believe that many teachers have not thoroughly analyzed the problems of legal responsibility relative to safety. A favorite way to insure legal immunity has been to post a sign in some conspicuous place to the effect that the students use the equipment at their own risk, and that the instructor is in no way responsible for injury received in the shop. Of course such signs are ridiculous and reveal a certain amount of false assumption on the part of the teacher. The fact is that the teacher has certain responsibilities which he cannot avoid in any way, regardless of the methods or devices used.

The question of negligence is one which cannot be settled once and for all. There are potential possibilities which might develop into debatable cases. For example, to cite incidents in other departments, one school district was found to be negligent because certain types of activities were permitted as a part of the regular physical education program. Another case of negligence was charged against a school district because students were permitted to participate in moving a piano. In both these cases the school districts were required to pay damages to injured pupils. It is evident that negligence cannot be defined in advance. Many questions come to mind when considering what might be interpreted as negligence in case the question should arise.

One very important question which involves many teachers has to do with the practice of posting danger signs in the shop. If a teacher, who is an agent of the school district, admits that a machine is dangerous, can he be charged with negligence for permitting pupils to use it? For example, a sign which reads as follows was seen in a junior high school woodshop: *This machine is dangerous. Think.* Still another sign in the same shop reads: *All machinery is dangerous. Keep hands away from moving parts.* A teacher displayed a printed form, the purpose of which was to provide proof that the pupils had covered certain safety requirements, and in two places on the form the words *dangerous machines* appeared. The point is that when the teacher admits that a machine is dangerous he has paved the way to the accusation of negligence. Another important question has to do with conditions imposed upon the teacher by higher authority. For example, if a shop is equipped for a given number of pupils, which is evidenced by the number of seats, benches, and tools, is the question of negligence involved if more pupils are enrolled, and crowded conditions are blamed for an injury? It must be admitted that there is a point of diminishing returns in this matter of class size. Then does it constitute an act of negligence to assign a teacher more pupils than his shop equipment provides for, or more than one teacher can be reasonably expected to supervise?

These examples merely illustrate problems of which the teacher must be aware. There are many more in every teaching situation which are equally provocative. On the one hand, the teacher must guard himself against conditions which can be challenged in regard to the question of negligence; on the other hand, he must be alert to conditions imposed upon him which might prove a hazard in the shop. The teacher can clear up conditions for which he is responsible and over which he has direct authority. He can be alert to conditions imposed upon his shop and protest to the person in charge, who then must assume the responsibility. In either case, it is the responsibility of the teacher to attempt to eliminate all such conditions which might be challenged if the question of negligence should arise.

Certain practices engaged in by the teacher could easily be challenged if the occasion should arise. In case of question as to procedure on the part of the teacher, any irregularity is to be cited as damaging evidence. Deliberate acts of negligence are not going to be practiced by teachers, but there is a danger that certain practices which teachers ordinarily give no thought could be cited as negligence. The following precautions should be given consideration by every shop teacher:

1. Do not leave the shop with pupils working in it. Every shop teacher is aware of the fact that it is an act of gross negligence to leave a class unsupervised regardless of the purpose, but has equal consideration been given to the question of leaving a few trustworthy pupils in the shop during vacant periods or before and after school?

2. Do not permit power-driven machinery to be used while another teacher is in charge of your class. Frequently any teacher with a free period is sent to the shop while the regular teacher is called out on business. Lock the main power switch if this procedure is necessary.

3. Do not permit any equipment to be used which does not have the specific approval of the school board. Teachers frequently take personal equipment to the shop or permit pupils to do so. This practice is very convenient at times, but it can also prove disastrous. Ordinarily the teacher can depend upon the support of the school board in case legal charges are preferred, but such is not always the case if the teacher is operating the shop with private equipment.

4. Do not permit pupils to work in the shop except during regularly scheduled periods. It might prove embarrasing at times to try to explain why school shops are operating outside of school hours. Such procedure seldom has the approval of the school board, and any program not authorized by the school board is illegally conducted.

5. Do not permit a pupil from another class to work with machines even though he may be qualified to use them during his regular shop period. This involves such activities as making up lost time, project work in other classes, and extracurricular projects. If such procedure is necessary, the work should be limited to the use of hand tools. If machine operations are necessary they should be done by pupils of the regular class.

6. Clubs and so-called activity periods should be limited to classes or groups officially scheduled to the shop. After-school clubs are a source of pleasure, but in case of a pupil injury the teacher may be left without any official support from higher authority.

7. Pupils should not be sent outside the shop to perform hazardous duties. Every shop teacher is familiar with the unreasonable demands for extra work around the building and on the grounds. This is particularly true in the smaller schools where maintenance and repair are not regularly provided for.

8. The course of study should not make the use of power-driven machines compulsory. Students should never be required to use machinery. Teachers should take particular care to make this clear to the pupils. It is surprising to see how many pupils get the idea that everyone is required to work with the machines in the shop. It would be disastrous if an injured boy came out with the argument that he did not want to use the machinery in the shop but was required to do so by the teacher.

9. Do not willingly allow a dangerous worker in your class. Occasionally a boy who is so irresponsible that the teacher cannot afford to run the risk of permitting him to mingle with the other students, enrolls in a shop class. Unfortunately teachers seldom are given the authority to exclude such pupils from the class. In such cases, the teacher should make a written report to the proper administrative authority who then must remove the pupil or assume full responsibility.

10. Do not neglect to make a written record of every injury occurring in the shop. This procedure often seems to be a nuisance, but it is very important that the teacher have complete details of every injury. In case of serious accident, names

of witnesses should be included in the accident report. In cases where permanent injury is likely to result from the accident, records and evidence should be kept until after the injured person has attained the age of 21 years. There are known cases where the teacher has had to face legal action two times as the result of a single accident; once the injured boy's parents acting as his legal guardians, and again by the boy himself after he had become 21 years of age.

In general, the question of legal responsibility relative to the safety program in the school shop can be divided into three phases; namely, safety instruction, safe working conditions, and practices engaged in by the teacher. Without question, the teacher could be negligent in any of these. In case of proved negligence, the teacher cannot defend himself in any court. The problem confronting every shop teacher is to avoid any act of negligence by meeting the moral responsibility with which he is charged. It should be understood, however, that the teacher has not provided for legal protection by meeting his moral obligation. This is particularly true in regard to teaching safety because sufficient class instruction does not imply that every individual has had sufficient instruction. In the first place, individuals are not always present when classes are taught; furthermore, individuals can deny ever having been required to cover every item in the safety program. In view of these facts, the only safe plan for the teacher to follow is to provide proof that every pupil has completed all the requirements of a specified safety program. The most reliable and probably the simplest method of handling this is to require every pupil to sign some kind of test or form which provides evidence that he has covered the requirements of the safety program.

The problem of maintenance is a fairly simple one because safe working conditions apply to all pupils alike. It is not likely that a pupil could successfully refer to unsafe conditions which did not exist. The habit of teachers engaging in irregular practices, likewise, is a problem which can be solved by merely eliminating and avoiding all questionable situations. This problem, however, is a very important one because any irregular practices could be cited as acts of negligence.

The legal significance of the safety program confronting every shop teacher cannot be challenged. Like moral responsibility, it must be accepted as part of the total teaching situation. Teachers are not discouraged in facing these problems because they are meeting the moral and legal responsibilities involved. This fact is made evident by the confidence placed in the industrial-arts teacher and his program. The school board and the public at large are justified in assuming that the school shop is safe for all pupils, and that the teacher is morally and legally responsible for keeping it safe. Charged with this responsibility, it is well for the teacher to remember that any act of omission is an act of negligence.

Instructor Training in Vocational-Technical Training

*Verne C. Fryklund**

Vocational-technical education involves considerable emphasis on technical information, such as mathematics and science. It is difficult, however, to restrict the designation to these major subjects only, but it is fair to assume that the fuller emphasis is on technical knowledge. The types of occupations that could be included are almost without end. They represent an area of service that lies between the vocational trades and engineering, yet there is no distinct dividing line between any of the three categories. Mere categorical examples are technicians of many kinds whose main ability is in technical knowledge as well as in shop performance, supervisors who in addition to the foregoing must have a working understanding of human relations, production specialists who must have practical experience as well as an understanding of certain technical knowledges.

These work areas do not require the services represented in the full training of the engineer, though in years past engineers have been forced to work in these areas in order that the jobs would function, or that the engineers would have jobs. However, the economics of it is unwise, both as to human abilities and as to costs. The training of these middle-way technical workers need not involve the expanse of preparation that composes engineering. It requires only segments of a four-year preparation, and the time may cover from a few weeks to a couple of years according to the needs of the job.

Many of the individuals who work on the vocational-technical assignments are usually mature; they are individuals who already have had experience of a practical nature and who know their shortcomings in technical understanding. Your further understanding if necessary can best be had by referring to Bulletin No. 228, Vocational Division, Federal Security Agency, U. S. Office of Education.

The Time Is Now

The war and the postwar era has and is uncovering new materials, new processes, and new products and these are increasing at rapidly accumulating rates. Education of high quality, therefore, must be made available for these technical workers now. Training has proved its value before the war, and in all activities related to the war, and the public is training conscious, as is evidenced in the passing of the George-Barton Bill. Witness also the rush for G.I. education. And, by the way, much G.I. education could well be along lines of vocational-technical work. Many veterans express dissatisfaction with the long period of education in engineering programs and their long explorations into the theoretic; they want practical results in training for technical service, and vocational-technical education fulfills this desire.

Vocational-technical education must be provided by whatever public agency can give it and the vocational authorities at secondary school level must be ready to join in this work. Let's be clear that it is terminal education and not for college preparation, however. It is for specific work jobs in industry; jobs that cannot be filled by the usual type of mechanics, but can be filled by persons of less than engineering grade.

A Task for Secondary Schools

Adult education classes are the major means of this special training at the secondary level. Short term pre-employment training, supplementary training for employed workers, and part-time co-operative training are the more specific types of adult programs operative at this level.

Because of the nature of the training involved, technical institutes and colleges that will offer the necessary short courses are in position to give ready service. They now have substantial equipment, laboratories, and have or can obtain instructors. But technical institutes and colleges are not available in all communities, and therefore the secondary school should assist.

The larger the community and the greater the number of industrial establishments, the more readily the job of voca-

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tional technical training can be carried out. The greater the demand for variety of such workers, the more successfully the job can be carried out by the secondary school. It will not be restricted by tradition, and limited existing equipment, and can carry on in industry where the various types of necessary equipment are located. The secondary school authorities can and should supervise the program, and the closer to the job that the instruction is carried out, the quicker the training, the better the job satisfaction, and the more satisfactory the results. We learned in war training that visualized education lessens the training time. The more this technical training can be done, on or near the job, the more visual it will be, the more economical it will be in equipment and utilization, and the better the morale of the learners and the instructors.

Supply of Instructors

Men of practical experience are needed to instruct in this program just as surely as in the vocational-trade program. Each will need instructor training that includes orientation, human relations, some practical lessons on the trade analysis technique, a few effective lessons on how to instruct, followed by instruction in evaluation procedures. The value of the analysis technique in this program in addition to learning how to identify and list units is in the training it gives on how to restrict the size of a lesson, and what to leave out in the course in order that unnecessary theory will not be given the major emphasis.

If there is a choice between a college instructor of a general subject and a man who has had long experience on the job, it might be well to choose the man of experience on the job, if he has personality. He should be given a few lessons in teaching, if necessary. There are many specialties in a given area of work. Chemistry is an example. Certain chemical laboratory work is so highly specialized that a chemistry course may be only indirectly or remotely useful and therefore might be wasteful. The practical man would likely know what to leave out, and he would likely be more certain to leave it out and utilize only that which was necessary. We must keep in mind that extensive exploration of theories is wasteful in this program. It is not a long-time program as is engineering. The time cannot readily be fixed except by the needs of the eventual job assignments, or the extent of upgrading needed for the individual to better qualify for his present job. A supply of instructors of varying abilities is needed, inasmuch as there are not likely to be many workers needed in one occupation, but rather a scattering of workers in many occupations. Training would be carried on accordingly. It is also likely that a continuing flow of vocational-technical workers in large numbers, and of varied abilities, will be more the exception than the rule. The apprenticeship plan of training will be practiced quite frequently. This complicates the provision of instructional service and leads to one oft-practiced solution, the call-staff of many instructors in many specialities, instructors who will be ready to contribute on occasions when called.

Training of Vocational-Technical Instructors

A prescription in exact detail covering the procedure for instructor training is difficult at this stage of development of vocational-technical training. It will be necessary to study your own situation just as was done in the military, as at Ft. Knox, for example. There the plan of group instructor training was carried out following a very detailed study of the situation. Your local situation will determine whether group or individual instructor training or both should be utilized.

You should consider instructor training on a group basis first if you can. It offers opportunity for discussion and exchange of ideas. It is economical and interesting that way. Then follow with individual remedial work. Individual instructor training is somewhat of a bore, wasteful, and too frequently it is impractical. A constant repetition may occur unless it is preceded by group training. But you may have a situation where you have to do it on an individual basis all the way and make the best of it. At Ft. Knox the situation was a natural for group instructor training. It would not have been successful any other way.

It will be necessary to give an orientation lesson or two — a few lessons relating to the purposes and meaning of vocational-technical education early in the course. As you know, the objectives determine the manner of attack on the problem, the organization of subject matter, and the methods of teaching. Next, a few lessons in human relations are in order so the instructor will get along amiably with his students. I need not tell the experienced teacher what these few lessons should be. They need not be extensive classes in psychology. A few lessons concerning emotions, feelings, attitudes, laws of learning, individual differences would suffice if given in a straightforward simple manner, just as any good teaching should be done. The teacher trainer himself must know how to teach. He must teach by example. If a teacher will learn to treat the other fellow like he himself would want to be treated, he has learned a lot of practical psychology.

The trade analysis technique, earlier referred to, must be simple. Too many teacher trainers are still experimenting with involved, impractical procedures that proved doubtful long ago. If the results of the analysis are to be used, the procedure must be simple. In vocational-technical instructor training, it is important to explain and show the differences between manipulative units and informative units, and clearly and simply classify the informative units into three kinds: the technical, general, and guidance topics. The ability to identify information topics enables the instructor to select the necessary related information and thus keep out that which is unnecessary for the training of vocational-technical workers.

In referring to the trade analysis technique, supervisors and teacher trainers of experience will agree that it is the first step in instructor training after the purposes of vocational-technical training have been defined. While the technique is being learned, the student instructor can be developing the list of units that he later expects to teach. This is important. He, too, is learning by doing.

One of the reasons for encouraging group instructor training, in addition to the reasons earlier mentioned, is that instruction on how to instruct and demonstration lessons, as well as a few practice lessons, are thus possible. Individual instructor training does not permit this valuable phase of instructor training. This leads to the next phase, instruction in how to teach the units listed by means of analysis. The step by step breakdown of operations as made in the analysis will be useful here. The breakdown, quite as was used in JIT is very desirable. It assures inclusion of every necessary point in the lesson. The two column form used in JIT need not be used. The single column is simpler. I am not going into detail here, except to state that consideration is necessary of methods of presenting manipulative as well as informational lessons. Don't get too enthusiastic about the four Herbartian steps in detailed application, however. They were meant for paper study mainly. If your student teacher is bright, he will soon discover that the four steps are more useful in discussion of teaching than in step-by-step routine application.

The next phase of instructor training involves evaluation of results — how did the instruction take. Examinations are necessary, and in order to provide the beginning instructor with some knowledge, of limited nature, on how to make and give examinations, and otherwise evaluate results of instruction, you will want to spend as much time on that, as on analysis. By this time, your new teacher already has been actually teaching and the evaluation phase constitutes a new and distinct series. There is much to do here, especially in selling the new teacher on the importance of making valid, comprehensive, and reliable evaluating devices.

What has been presented thus far for instructor training is of first-aid nature; it is the kind of instructor training necessary in order to get the vocational-technical education program started. About twenty clock hours should be devoted to it. Then upon first opportunity a series of two credit courses should be given that would really cover the above mentioned topics in a refined and thorough way, and a few more courses, and thus make a professional teacher in a program that gives every indication of long usefulness and continued growth.

Industrial-Arts Teacher Training

*Claude E. Nihart**

During the war years, industrial-arts programs throughout the nation suffered severe setbacks due to unavoidable restrictions such as the shortage of trained teachers, worn out equipment that could not be replaced, and the lack of supplies. Now that we are on the road back, a problem of most vital concern is the training of industrial-arts teachers in order that closed shops may be reopened and new schools now being planned may be staffed. In the next ten years, directors and supervisors of industrial arts in towns and cities will have the responsibility of assisting in the selection of large numbers of teachers, many of whom are now in training. The quality and type of this training is of major importance.

Probably the greatest advance in industrial-arts teacher training in the past ten years has been the emphasis on teaching methods, curriculum building, tests and testing, vocational guidance, and the use of audio-visual teaching materials. There has been a continual expansion and improvement of both professional and academic offerings. In other areas of industrial-arts teacher training the advance has not kept pace. A few suggestions from the field may prove helpful.

Superior Teaching and Organization

The best teaching and organization practices should be in evidence. Teacher-training shop classes should be examples of the best in teaching methods and shop organization. That which is discussed and developed in professional courses should be immediately put into practice in shop courses. There should be close co-ordination between the two. Progressive ideas are only worth while when they pass from the talking stage and result in action. In visiting college shop classes, how rarely does one see a well-prepared and well-executed demonstration, a course of study in use, teaching materials conveniently filed, individual-record cards, well-designed and well-constructed projects on display, audio-visual teaching material in use, a satisfactory supply and tool-issue system, a quick method of checking attendance, and a planned program of democratic student control in operation. All of these evidences of good teaching and organization one would expect to find in a well-conducted high school shop. If sound methods of instruction and good shop organization are practiced in college classes, the adjustment of the beginning teacher to public-school conditions becomes comparatively simple.

Emphasis on Skills

Additional emphasis on hand tool and machine skills. Some years ago an examination was given for general metal teachers. One part of the examination consisted of a performance test in which each candidate was required to do simple pieces of work in sheet metal, art metal, forging, metal casting, welding, and machine-shop practice. Of the 20 candidates taking the test, 12 had difficulty in making a tin cup which was used at that time as a sheet-metal project in junior high schools. Most of the candidates had just graduated with degrees in industrial arts. Through inquiry it was learned that sheet metal was given the second year in college and students had lost their skill and had forgotten most of what they had known about sheet metal by the time the examination was given. It would appear advisable just before graduation for the college to give short unit refresher courses and comprehensive tests in all shop subjects which the student is credentialed to teach. The beginning teacher has little time to review shop subjects after school starts.

Keep Courses up to Date

Shop courses should be kept up to date. All too many colleges are still in the mission-furniture, hammered-copper era. Designs, construction, and finish of projects and shop practices in general are outmoded. The colleges should lead in up-to-date methods and practices. They should be the center where new ideas and new ways of doing things are developed. Of course, they should be cognizant of what is going on in the public schools and adapt the best of these practices to their own use. But this should not be a one-way road. Colleges should give back to the public schools the results of their best thinking, their experimentations, and the worth-while things they have developed. Experiments and new ideas should be thoroughly tried out and refined in the light of practice before they are recommended for use. Teacher-training instructors should make frequent visits to public school industrial-arts classes in order that they may properly gear the college program to the needs of teachers and pupils in elementary and secondary schools.

Developing Instructional Material

The development of instructional material should be stressed. Probably one of the most urgent needs of the beginning industrial-arts teacher is to have sufficient instructional material such as job sheets, project drawings, objective tests, charts, process boards, sample projects, etc., to get him by his first year of teaching. It should be the responsibility of the college to see to it that each graduating student has developed a kit of instructional material for each industrial-arts subject he is credentialed to teach. It must have a definite boy interest and be of a suitable degree of difficulty for the various grade levels. The development of this material should be carried on in both shop and professional courses. Recently several colleges recognizing this need have organized courses devoted entirely to the development of instructional material.

Selecting Proper Teacher-Training Material

The selection of students for teacher-training. Among the thousands of young men now training to become industrial-arts teachers are those who are temperamentally unfit for teaching, have no aptitude for teaching, or are not mechanically inclined. Any one of these or similar factors should be sufficient to bar a candidate. Weak students should be weeded out early in their college careers. The teaching profession already has too many marginal teachers. To permit inferior students to complete their college requirements and begin teaching is one of the surest ways of scuttling the entire industrial-arts program.

Proper Supervision

Shop classes should be carefully supervised. In some teacher-training classes, the first hour is devoted to lectures and demonstrations followed by laboratory periods where students work on their own. This may be a satisfactory arrangement for science courses, but in shop courses students need the help and guidance of the instructor if manipulative skills are to be thoroughly developed. The instructor should be *on the job* correcting poor practices, redemonstrating where needed, and in general, keeping alert to the progress of individual members of the class. There may be some justification for letting advanced students work on their own, but certainly not unless they have already developed a high degree of skill in their work.

Field Trips

Student field trips. It has become the custom in some colleges to arrange all day visits for seniors to industrial-arts classes in the secondary schools of nearby cities and to industrial plants where production methods are observed and studied. Both types of field trips are intensely valuable and stimulating. They probably should become regular requirements of teacher-training programs.

Exchange of industrial-arts teachers. Few college instructors have had recent experience in public school teaching. They lack an appreciation of the many problems confronting public school teachers and students. A plan to remedy this situation

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has been suggested. It consists of an exchange for one or two semesters of college and high school instructors in like industrial-arts areas. These teachers should be outstanding in their work. There are several technical difficulties to be overcome before this plan can be put into operation. There is no doubt but that a teacher exchange would be mutually beneficial to colleges and high schools.

Salary increase needed for college instructors. The salary schedule for college industrial-arts instructors is in many instances lower than the schedules of secondary schools in near-by cities. Until the college salaries are comparable or higher than those of the secondary schools, the best teachers cannot be secured. Many excellent teachers continue in college work because they love that level of teaching, but to expect these superior men to stay on indefinitely when they can better themselves financially elsewhere is not based on sound reasoning. It is encouraging to note that recently a number of colleges have given substantial salary increases to their instructors.

The success of the public school industrial-arts program depends to a marked degree upon the quality of industrial-arts teacher training provided by the colleges. Those vitally concerned with both programs must work together in close cooperation if industrial arts is to retain its place as an integral part of general education.

A Five-Year Curriculum in Teacher Training

*Frank J. Kovach**

The success of a program of education for the preparation of a prospective teacher is more dependent upon the appropriate education of the educator than upon any other single factor. It is of full importance that any program of teacher preparation take into account individual differences and at the same time provide a broad cultural background. The educational program should be of such a nature that it will have for its objective a large social purpose.

A functional educational program should not train for the mere skills in the processes of education but must have a real insight into the social and economic order.

An educator needs to be broadly trained because he directs the general education of students, and his own level of thought and education should be beyond the level of those whom he is required to teach.

The question may be asked, just what type of training should a teacher receive so that he will be well equipped in a broad general and specialized education. If one is to go under the assumption that the processes of living and learning are to be interrelated throughout life it seems quite desirable that in order to set up a program of such a broad nature it would be well to require a more interrelated program of study in the preparation of teachers. In order to obtain this end, a five-year integrated plan for training industrial-education teachers is recommended. This plan, however, is not to be interpreted as a final preparation in industrial education, but it will mark the beginning of a program which it is hoped will be continued through life. The five-year plan would be one of preprofessional preparation.

Preprofessional Training

The type of program set up for prospective teachers should be determined by the needs of those whom they are to teach. This assumption at once calls for a broad preparation on the part of the educator who is to direct the general education of the children. The modern school curriculum calls for integration of duties with other areas of the school.

The ideal pattern is one which develops the teacher as an educated person well equipped to teach immediately upon graduation. He must be thoroughly grounded in his subject matter; capable of well-rounded development; and he must be able to adjust himself in school and in his relation to the community. The curriculum should be selected and organized in such a manner that it will lead directly to these ends. However, there are many questions to be considered. These relate to such matters as the differences, if any, in the program of teachers at different levels, and the extent of and proper balance between general education and specialization.

In order to give a prospective teacher a thorough training in the teaching profession the length of training should be extended. Graduate work for teaching below the level of college education is becoming more common. It probably would be in line with the modern trends to require a five-year integrated curriculum in industrial education for secondary teachers so as to provide a more thorough preparation. This would be in harmony with the plan already carried out in the state of California. The limitation of the four-year plan leaves wide gaps in the general training that is required of secondary teachers. A long period of training could provide plans for the development of more desirable relationship with other activities appealing to boys interests, such as hobbies, boy scout work, and other such activities.

Nature of Training

The first two years of the five-year plan would be training of a broad cultural nature. General introductory and orientation courses in basic fields such as social sciences, natural sciences, general psychology, geography, music, art, and industrial studies. A strong emphasis upon creative ability in writing and speech. Advance unit courses should be available for students who have had special preparation in high school or other schools.

Courses in education are to be introduced the first year and are to be continued throughout the five years of training.

Practice teaching should not be allowed until the junior year and the assignment should vary for different students depending upon the quality of performance.

Curriculum Materials and Appropriate Background

The amount and nature of the work to be taken by prospective teachers of industrial education should be controlled the first two years. This is not to be interpreted to mean that the last three years will allow for any great amount of free electives. The courses in the third, fourth, and fifth years of study would still be largely constants or restricted electives in the various fields and the amount to be taken would be controlled. Courses taken should be considered only in response to an actual need in the managing of situations that arise in the teaching of children. Such a program involves a readjustment of the industrial-education curriculum in the field of shopwork. The change can best be accomplished in a laboratory school. The purpose of the laboratory school would be to provide a broad training in place of the old method of training to do for the sake of accomplishment. This at once calls for a change in the college curriculum in the teaching of shop courses. For example, a course in electricity should be changed to general electricity.

The common practice of teaching electricity has been chiefly in the nature of

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exercises pertaining to house and bell wiring, and ohm's law. A course in electricity should provide a much greater variation. In order to be in line with modern trends the course in general electricity should include such topics as: use of electricity in industry, communication and transportation; experiences in various devices for communication, applied electricity (motors, generators, transformers, and the like), care and operation of home equipment, and providing for individual experiments and investigations.

The information and technical knowledge should not be substituted for actual work of a constructional nature. The two must integrate so as to bring about a better balance in the training of the individual.

Beginning courses in industrial education could all be treated in this manner. This procedure would bring a better understanding on the part of the teacher as to what constitutes broad laboratory courses in this field. This can best be accomplished by having a laboratory school specially provided for training of this nature. The philosophy of teaching of industrial education can best be accomplished by putting the theory into actual practice. Being told about the broad concept of industrial education and then receiving training in shop work which does not parallel this theory, falls short of such policies, and when one is to start teaching shop courses he is very likely to teach it the same way it was taught to him.

The principles as set up in the field of industrial education may be well understood, but the practice as carried out seems to belie this.

Total Industrial Education Curriculum Requirements

A five-year integrated curriculum in industrial education should have a requirement of approximately 237 quarter hours for graduation without a thesis. The distribution of the amount of work in quarter hours to be required in the various fields is education 40, academic 50, industrial professional courses 45, shopwork and drawing 45, practice teaching 9 to 16, research problems 9, and electives 32 to 40.

Education

The work in education should constitute a central core of integrated activities and materials throughout the five years of the curriculum. The educational courses should include general and educational psychology, mental hygiene, personality development, theory and practice of teaching, classroom management, mental and achievement testing, curriculum materials, teaching techniques, philosophy of education, organization and programs of modern schools, and elementary statistics.

Conclusion

The five-year plan would allow for a much broader field of study, and would, if properly carried out, provide for a background more in line with modern trends. The broad demand in general education for the preparation of teachers calls for a need of extending the period of education so that specialization, technical perfection, and extracurricular activities in education and in teaching can be attained.

Courses in orientation should cut across departments so as to procure a better balance in the entire program of learning than just a mere part of it. The nature of such a program should be put into practice in the entire five years of study. Too much emphasis cannot be placed upon courses providing for desirable social and personality traits. Courses in extracurricular activities should provide for some of these opportunities. In order to carry out such a program, suitable facilities for an adequate program of extracurricular activities must be provided for.

Superintendents hire prospective teachers who have had not only intellectual experiences, but also have a record of an unusual amount of extracurricular participation, plus a high level of accomplishment in these activities.

A five-year integrated plan for industrial education should require wide participation in the extracurricular activities. Some of the activities ought to carry credit value while others should not.

A school of higher learning should provide a proper proportion for the cultivation of the physical, social, and aesthetic experience in addition to the development of intellectual experiences, latent abilities, and aptitudes.

Preparing for the Industrial Phases of War

*Colonel Edward A. Fitzpatrick**

The next war, we are told, will be a push-button war. Everything will be set: the enemy atomic fleet will approach our shores, our air-borne forces with their newest instruments of destruction will proceed immediately to meet them. Notice will be flashed to all the centers for launching atomic missiles with atomic heads. The new missiles will be released. There will be wide-ranged destruction here and in enemy countries. Within the day the war will be over. Total preparation, readiness, and alertness will have been repaid in excessive destruction of the enemy's country and population.

Push-Button War Overemphasized

Of course, it isn't going to be as simple as that, and the emphasis on push-button war is, at least, somewhat exaggerated, but there is a new kind of war ahead and the old planning and the old strategy and the old logistics will not meet the new situation. There will be no time for paper plans, for dawdling, for incompetence for setting up our industrial machine to get it into maximum production, nor for training great bodies of troops. Military art will not solve the problems, and they are not problems solely for generals and admirals, soldiers and sailors. Perhaps one of the rather clear indications that a new situation confronts us, if not evident in all the activities of the military authorities, is evident in the transformation of the old Army Industrial College into the new Industrial College of the Armed Forces, a joint educational institution for the army and the navy.

The Army Industrial College Established in 1924

The Army Industrial College was established in February, 1924. It was to train army officers in useful knowledge pertaining to the procurement of military supplies in time of war and to assure a steady flow of such supplies. The official definition of the function of the college is practically the exact wording of the function of the office of the Assistant Secretary of War in the National Defense Act of 1920. The real objective of the college at the time was apparently to enable the Assistant Secretary of War to perform his functions with reference to the procurement of military supplies in wartime and to aid the planning division in its functions. The early training was recently described as "makeshift," at least it was a kind of apprenticeship. But there was a recognition of the need for training, the need for staff work, and the need for planning in the field of military supply. It became clear later that the problem of procurement of supplies of guns, tanks, airplanes, copper wire, and all the thousands of things included as military

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munitions, equipment, supplies, was only a foundation phase of the problem.

Industrial Mobilization Becomes Popular

The term *industrial mobilization* became popular. It tended to be substituted for the word *procurement*. This was to be the organization of the industrial productive facilities of the country for the purpose of supplying the army and the navy in wartime. For a time the idea of industrial mobilization seems to lose sight of its main purpose, the procurement of supplies in adequate quantity at the time and place needed by the military forces. It became occupied with superagencies and problems of over-all control. This came about by the separation of the functions of provisions for material and of man power between the general staff and the office of the Assistant Secretary of War under the National Defense Act. It was further emphasized by the fact that the actual procurement was in the technical services like the signal corps and the ordnance which was under the Chief of Staff. And yet, in the last analysis, all that an industrial mobilization plan is, is the way we are going about when the emergency comes, in a systematic, organized way, to procure in the most effective manner the military supplies needed to achieve specific military objectives, and to guarantee the end supplies in the amount, at the time and place needed by a military force, adequate for victory.

Neglect of Industrial Man Power

There was one strange aspect of this problem as it developed, namely, the failure to consider the problem of industrial man power as a phase of industrial mobilization plans. Industrial mobilization plans of 1930, 1933, 1936, and 1939 had no practical program for the recruitment of war industrial man power. The so-called planning got lost in superagencies and lost their connection with the technical services of the armed forces where the actual procurement of supplies was carried out.

Victory Does Not Sanctify the Means

If we look at the over-all results of our wartime activities, of course, the dominant fact is that we won the war. Consequently, everything that we did acquires a halo. It is strange how this idea recurs in postwar reports as if the end sanctified the means. However, our failures in industrial mobilization planning resulted in terrible wastage and high cost in terms of men, material, and money. The pathology of the industrial mobilization plan is indicated in the Affaire Garsson, the Canol oil project, the Alcan highway, and the numerous other specific cases contained in the Truman-Mead Committee reports. There is no point at this time in repeating these specifications.

A New Alerted Institution

The Army Industrial College was discontinued at the beginning of the war and was revived December 28, 1943, under the same commandant, Colonel Francis H. Miles, Jr. The first class began January 3, 1944. Large numbers of individuals were trained in a short course on contract negotiations. A transitional class was admitted in January, 1945, and the students were majors, lieutenant colonels, colonels, and various ranks of naval officers with war experience. It was thought helpful to have these men study the problems of industrial mobilization and interpret the industrial mobilization in the light of their experience. While this was going on, the second postwar commandant of the college, General Donald Armstrong, was working hard to give the revived college a new function, a new wider relation, a new and greater prestige, and a wider scope to its activities. The college became the Industrial College of the Armed Forces, a joint enterprise of the army and the navy. Active co-operation was promoted with the industrial leaders of the country, and contact was made with the higher educational institutions and the departments of government. A joint army and navy committee known as the Hancock Committee, from its chairman, studied the problem and recommended the joint character for the institution and a place alongside the National War College. As a result of the acceptance of the recommendations, the college acquired new and added prestige. The Industrial College must now live up to its new position and its new prestige.

Wider Scope of the College

The scope of the activities of the college might be expressed by the term that is progressively replacing the term *industrial mobilization*, namely, *economic mobilization*. The procurement function is still emphasized, and in this way the college retains its birthmarks, but there is an emphasis on a broader planning activity that might be called economic mobilization, including the subject of economic warfare, particularly as it emerged during the last war. Economic war, the weakening of the enemy industrial capacity and potential, and the strengthening of our own, will acquire increasing importance as the Industrial College develops, and as the exploration of the whole field shows more clearly what war reveals. Economic warfare is having a secure basis built in the work of foreign economic resources.

New Emphasis on Man Power

All of these achievements were capped in the major effort to make the revived college *man-power conscious*. Industrial mobilization must include industrial man power. An outside expert was brought in to further accentuate the positive emphasis.

A New Location and a New Commandant

The newly baptised Industrial College of the Armed Forces moved to the grounds of the Army War College. The mere change in physical site is not the important thing. The new location of the college is a symbol of its new prestige. It is, in the system of the armed forces, on the highest educational level right alongside the National War College. These two institutions will now work in close co-operation, exchanging lectures and making their facilities available to each other. This means closer relationship between the military strategy of the armed forces and the services of supply necessary to provide the guns, tanks, airplanes, etc. It will be much more difficult to commit the American people to policies to which its military forces and the industrial machine cannot back up. Along with the change in location a new young, active commanding officer, General Edward B. McKinley, was placed in charge. His responsibility will be to further develop the work begun by General Armstrong in giving the college new prestige, higher position in the educational system of the armed forces, develop the public relations with educational institutions, industrial establishments, industrial laboratories, and government departments, and more particularly to develop the internal organization and character of the educational work of the college.

Provision for Uninterrupted Continuing Research by Civilians

The college, as now organized, has two main divisions, a division of research, and a division of instruction. The division of research, formally organized under Colonel Miles when the college was revived, is especially active in the development of the research work of the armed forces. A group of civilian research specialists have been appointed whose responsibility will be to keep investigating continuously the various problems of procurement, of industrial mobilization, and of economic warfare. The idea was initiated by Colonel Miles, the first postwar commandant. In fact, every aspect of the economics of war will be continuously investigated. The important thing about these research specialists is that they are civilians. The civilians are not assigned to the college for a tour of duty and then taken off and assigned to an entirely unrelated function. They make possible indefinite continuity of study of the problems within the sphere of the Industrial College. It will be necessary to supervise their work carefully and to keep them in close touch with the strategic planning of the staff agencies and with an actually maneuvering army, which will be testing the various aspects of strategical, tactical, and logistical phases of war.

What is Taught in the Industrial College

There is also organized a special department of instruction which is charged with the responsibility of training the hundred or more officers who are coming annually to the college for a year's work. The curriculum at the present time includes manpower problems, production, purchase and policy, organization and administration. There is planned for the future a further development of these fields. An anticipa-

tion of the direction of this development is the precept which was to guide the special committee which reported early in February, 1946. The investigation was based on the following five points:

1. The demands of another war on the technological, social, and economic resources of this nation will increase vastly over those of World War II.
2. An attack on this nation will occur suddenly and with little or no warning.
3. The problems of production and supply in warfare will increase relative to the problems of purely military strategy.
4. A future war will test the planning and performance of industrial mobilization far more severely than has the recent conflict. Plans must be made for a faster start and a stronger finish. Technology will facilitate and accelerate aggression, and an enemy of an economic stature equal to or greater than our own may attack this country.
5. Consequently, army and navy procurement planning and procurement must be more closely integrated than in the present war. The army and the navy must look beyond the limits of departmentalism and co-operate with other government and civilian agencies in working out, before hostilities begin, an over-all co-ordination of our war effort capable of meeting the requirements of total war.

This committee outlined a comprehensive plan for the development of the college, was responsible for the formal changing of its name, of recommending a higher status for the college in the educational system of the armed forces, and indicated scope of its work.

New Educational Problem

There have been self-studies of the educational program of the college within the college itself, challenging the educational ideas underlying the educational methods of the army schools. The new commandant of the Industrial College is definitely conscious of its educational problems, and in meeting them will render a real service to the educational system of the army in its various schools.

Co-operation with Industry

The college has set out deliberately to build up industrial co-operation and good will. Individual industrialists in considerable number have been made advisers to the college, and industrial committees have been organized both on commodity and on industrial lines. A special organization unit has been set up in the college to promote these relations. It is important that these relations be developed, but it is very much more important that they be utilized. The lines along which the co-operation is to develop are indicated in the definition of the function of the mission of the industry advisory committees:

1. To increase the mutual understanding between the armed services and all elements of the war potential of the United States. War potential includes natural resources, industrial facilities and services, man power, and scientific and educational institutions.
2. To determine errors and deficiencies in mobilizing our war potential in World War II in order to develop and recommend policies and procedures for improving subsequent mobilization plans for industry.
3. To keep industry or other activity concerned constantly informed on War Department procurement policies and on probable military requirements.
4. To keep the armed services informed regarding the ability of each element of the war potential to meet military requirements. Depletion of natural resources and stockpiling are particularly essential subjects of study under this heading.
5. To inform the armed services of technological developments and to educate them on what they need or should need from the group represented. The college has the responsibility of applying social and technological progress to national defense. Industry should concern itself with advancing simplifications and standardization in military specifications, to the end that mass production can be facilitated.
6. To assist in keeping the American citizen aware of the necessity of an adequate defense program.

More Informed and Intelligent Logistical Plans be Needed

Total war! Technical war! Economic warfare! The economics of war! Industrial mobilization! Economic mobilization! National mobilization! Industrial capacity! The industrial potential for war! These are the subjects the Industrial College of the Armed Forces is interested in. These are the subjects on which it must become the center of information for the army and the navy. This is the place planners and strategists and tacticians will look for basic information on the logistical side of their plans. The college will in no way be responsible for plans, but it is certain to make possible more informed and intelligent war planning.

Educational Program in Peru

*A. Edward Stuntz**

One of Peru's largest newspapers, *La Prensa* in Lima, recently introduced a full-page feature with the following unequivocal statement:

"In the educational field we can state without fear of error that the point of greatest interest and attraction at the present moment is the progress in the work of the Summer School established under the Plan for the Reorganization of Technical Education and for which 500 teachers from all Departments of the Republic have come to Lima."

The article then continued:

"Among the special training courses that are being given in the Summer School is one on health and nutrition, under the direction of Mrs. Jean S. Corry, expert in health and domestic science of the Servicio Cooperativo Peruano-Norteamericano de Educación. With her characteristic competence and ability she has prepared her program carefully. Among its outstanding purposes is the need to create an interest in a broader health education, to stimulate the desire to improve the diet by applying the principles of nutrition, to emphasize the professional attitude toward the responsibility of teachers in health education programs, and also to deal at close range with matters relating to nutrition, procurement of foodstuffs, markets and general and specific diseases and their control."

The several-thousand word article is a tassel on the mortar board of a United States government agency which for three years has developed and nurtured hemisphere co-operation in the solution of basic educational problems. Both Mrs. Jean S. Corry and Robert Doyle Smith, who are given recognition in the *La Prensa* feature article, are field members of the Inter-American Educational Foundation which assisted in developing hemisphere unity during the war and which, during the postwar period, proposes to cement the understanding already existing, by establishing a means for continuing co-operation in education. The Foundation works through 15 bilateral educational agreements with the ministries of education of 14 American republics.

Co-operation in Vocational Education

The Co-operative Educational Program in effect with Peru, emphazing co-operation in vocational education, was the first to be negotiated. It was signed April, 1944, by Kenneth Holland, president of the Inter-American Educational Foundation, and the then minister of public education of Peru, Enrique Laroza. While it is understood that at the end of a three-year period the Foundation will bow out of the agreement, the program will continue under the sole auspices of the Peruvian government which has gradually taken over more and more of the responsibility in anticipation of that time.

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However, to put first things first, it must be noted that long-standing United States-Peruvian co-operation in the educational field dates beyond the signing of a formal bilateral agreement. Earlier organized educational assistance was given Peru by the Office of Inter-American Affairs when its co-ordination committee for Peru received a request from Dr. Carlos Rodriguez Pastor, director of normal school education, for a professor from the United States to teach English in the national normal schools and to supervise the teaching of English in all public schools.

This request should not be construed as an indication that Peru felt itself incapable of handling its own education program. It was rather an indication of willingness, even eagerness, to be a good neighbor. For Peru, as the United States, accepts the truism that a widespread knowledge of English on the part of nationals in the other American republics is an important base for effective comprehensive education programs in those countries.

Reginald Reindorp was the man approved to initiate the job. He earned the approval of the Peruvian government with his capable handling of the English teaching program, before leaving to become special representative of the Educational Foundation in El Salvador in 1945.

His successor as supervisor of English in the national normal schools was Charles J. Michalski, who had done undergraduate work at State Teachers College, Edinboro, Pa., and had pursued graduate studies at Middlebury College, Vt., and at the University of Michigan, Ann Arbor, where he received a master's degree in speech and general linguistics.

In the course of his varied editorial and teaching career, he taught at the English Language Institute at the University of Michigan as special assistant to Professor Charles Fries. He later participated in the special program for Latin Americans sponsored by Bucknell University, Lewisburg, Pa., and taught in a workshop for English teachers at the University of Puerto Rico, at Rio Piedras.

In February of this year, Dr. Clifford Prator, English teaching specialist on the Washington staff of the Educational Foundation, spent a week in Lima reviewing with Mr. Michalski completed projects and future activities of the English teaching program, which was made a phase of the Co-operative Educational Program in Peru after April, 1944. Listed as a future project is a plan for a six-month workshop for the revision of the English course of study in Peruvian schools.

The third intensive Summer Institute for Peruvian teachers of English was in session in Lima during Dr. Prator's visit. [The first was conducted from January to March, 1944, under the auspices of the co-ordination committee, the Instituto Cultural Peruano-Norteamericano and the Peruvian ministry of public education. Its purpose was to aid Peruvian instructors of English in the improvement of teaching techniques. Steps were taken at this initial Institute to meet the lack of good English language texts for secondary school use in Peru. North American English teachers of the Instituto Cultural prepared a graded series of five texts which would meet the requirements of the Peruvian official school program and could be adopted by the ministry as official school texts. These texts *were* adopted as such and have had an important influence on the English teaching program in Peruvian secondary schools.]

Dr. Prator reported that at the third Institute the student body consisted of 135 English teachers from all parts of Peru, many of whom received, upon conclusion of this their third year of summer courses, a certificate entitling them to teach English in Peruvian schols. During his visit to the Institute Dr. Prator led two discussion groups which considered the fundamental question of objectives in modern language teaching. They concluded that the objective should be "to prepare a generation ready to play its part in the creation of a world organized for peace and international collaboration." The group later explored ways in which a serious adaptation of such an objective would influence the content of an English course.

Peru as a Country

This large country of Peru, in area about twice the size of Texas, and with some of the highest peaks of the Andes rising out of its heart, is old in cultural tradition. For centuries it was the center of the splendid Inca Empire. Later it became one of Spain's powerful viceroyalties in the New World. For two of the three centuries of Spanish rule, the present Peruvian capital, Lima, was the seat of a viceroyalty which held sway over all Spanish territory in South America, as far north as Panama, with the exception of Venezuela. This "City of Kings" became one of the richest and most aristocratic of Spanish capitals. It boasts today a university established in that period and now one of the oldest in the Hemisphere, the University of San Marcos, founded in 1551.

The present population of Peru is about 7,500,000. Of this number, at least 4,000,000 are direct descendants of the proud race of the Incas, many of them living in the highlands as did their antecedents, and 50 per cent of them clinging steadfastly to the Quechua or Aymara languages of their fathers. The population as a whole is only 42 per cent literate.

The food situation, while somewhat alleviated by co-operative programs of the Institute of Inter-American Affairs directed toward the development of new acreage, colonization, and dry farming, is serious. In an economy principally agricultural, 85 per cent of the population is dependent, directly or indirectly, upon agriculture and stock raising. Corn, native to Peru, is grown throughout the country, forming a staple food for a large part of the Indian population which suffers from a poorly balanced and frequently inadequate diet, and from insufficient medical attention.

In spite of these domestic problems which sometimes seem to loom almost as high as the Andes themselves, Peru readily accepted her full responsibility in the war for democratic ideals. In January, 1942, she severed relations with Germany, Italy, and Japan, and in February, 1945, announced that she considered herself in an "actual state of belligerency with Germany and Japan," after having diligently scoured Axis elements from her area. Her exports to the United States played an important role in the war effort. Among them were vital strategic ores, including vanadium, of which Peru produces half of the world's supply. Pyrethrum, rotenone, and flax were part of her war production output, along with increases in hides and skins, anthracite coal and alpaca wool.

For this type of sister republic the United States was more than ready to answer the call on the several occasions when the minister of education of Peru invited consultative assistance in the field of education. There gradually followed the working out of the co-operative educational program between the two countries.

The program is intended to encourage in Peru the general development of education, primarily along vocational lines. Over the period since April, 1944, the Foundation has assisted the Peruvian government to inaugurate an educational program over which that government ultimately will assume complete responsibility.

Training Peruvian Teachers

Emphazing the training of Peruvian educational experts and teachers for more effective solution of the country's problems, the program embraces several phases: the loan of United States consultative experts requested by the Peruvian ministry of public education; issuance of training grants permitting Peruvian educators to come to the United States; co-ordination of the project for teaching English in national normal schools; exploration of local educational needs and determination of projects needed; and adaptation and introduction of suitable teaching materials.

The program operates under a Servicio Cooperative Peruano-Norteamericano de Educacion (Peruvian-North American Co-operative Educational Service) created within the ministry of public education and staffed with Peruvian and United States educators. The foundation's special representative in Peru, J. Graham Sullivan, is director of the Servicio. Mr. Sullivan was formerly director of vocational education in San Diego, Calif., where he supervised the training of 150,000 warworkers.

The educational service is well staffed with consultants. Among them is Lyle Pember, vocational and industrial-arts specialist, who studied architectural design and engineering at the University of Southern California in Los Angeles, and pursued teacher-training studies under Dr. David Jackey and at the summer sessions of the University of California in Berkeley and Los Angeles. His experience in the vocational and industrial fields is wide. From 1938 to 1941 he was instructor and co-

ordinator of the technical institute course in building construction at Visalia Junior College, California. In the latter year he was granted leave of absence to serve as supervisor of vocational education for war production training for San Diego schools.

Robert Doyle Smith, materials specialist, who has concentrated on the industrial, aviation, and printing fields, is also engaged in the co-operative work. He received his training at Santa Barbara (Calif.) State College and at the Frank Wiggins Trade School in Los Angeles. Among the positions he held prior to joining the foundation staff were supervisor of in-plant training and visual education at Ryan Aeronautical Company in San Diego, supervisor of the curriculum unit of the Army Air Forces Technical Training School at San Bernardino Army Air Field in California, and instructor at Santa Ana Army Air Base, California.

Jean Siderfin Corry is specialist in home economics for the Peruvian Service. She was former director of home management and instructor in home economics at Mills College, Oakland, Calif. She has also worked with preschool children and has done case work in New York and in Montana. She attended the University of Idaho at Moscow, and Montana State University at Missoula; received her master's degree from Teacher's College, Columbia University, and studied family and child care at the New York School of Social Work.

Exchanging Teachers

Among the early phases of the co-operative program was educator exchange. Nine Peruvian leaders in education were invited to the United States for study and exploration in such fields as vocational training, agricultural training, literacy education, youth clubs and English teaching. They were:

Dr. Carlos Rodriguez Pastor, director of national normal schools; Señora Raquel Delgado de Castro, editor of the Peruvian *Health Magazine, Vida y Salud,* and director of women's radio programs in Lima; Dr. Alfonso Rivero Ferro, president of the Asociacion Nacional de Profesores de Idiomas del Peru; Dr. Antonio A. Cook, director of Primary School No. 462 in Magdalena del Mar, and Senor Moises Neyra Salazar, of the staff of Primary School No. 417 in Lima.

Jose Manuel Perez Gamio, secretary to the Peruvian minister of public education; Victor Tueros del Risco, professor of agriculture at Colegio Nacional San Luis Gonzaga, and professor of economics at Colegio San Jose de Ica; Victor Moya-Mendez Acevedo, director of the library, professor at the Instituto Pedagogico Nacional de Varones, and editor of the educational section of the Lima newspaper, *La Cronica;* Senora Angelica Zavala de Rojas, supervisor of languages in the ministry of public education, and member of the Asociacion de Profesores de Idiomas de Lima.

Two of the continuing general projects of the Servicio for the public at large have been the setting up of a library for interested persons, with a complete catalog, and a librarian in charge, and a series of radio programs on education in Peru, directed by Senorita Flores Chinarro. The programs are designed to make available to Peruvian listeners information about their educational system, to give recognition to and stimulate present good work in education, and to provide information about education methods employed in the United States. Numerous broadcasts have been devoted to presentation of materials in regard to the reorganization of technical education in Peru.

Other projects have dealt with, and are planned in, the fields of vocational, agricultural, and technical training at the normal school level. Three project agreements arranged late last year were signed by Mr. Sullivan and Jorge Basadre, minister of public education at that time. One called for a supply of dictionaries to be distributed to schools and other institutions offering advanced teacher-training courses in English for the preparation of English teachers and translators. The second provided for a fund for the purchase of equipment and materials for schools, and the third called for support and aid to be given to the Peruvian director general of technical education, Commander Fernando Romero, in his plan for the reorganization of technical education. It was concerning the health and nutrition facet of this plan that *La Prensa* reported in such glowing terms.

Peru's Postwar Educational Plans

The need for a program of technical and vocational education in Peru is understandable. Peru's postwar plans for the development of steel, coal and iron industries, hydroelectric power, and the building trades call for great numbers of skilled and semi-skilled workers. To date there have been only a very few technical and trade schools scattered throughout the Republic, and the supply of skilled workers is low. Consequently stress is laid on technical education. In training more of the population to produce more efficiently, the ministry and the Foundation hope to succeed in raising the living standards of the country by helping to produce an economy geared to a modern world.

One of the steps in the development of this type of education was the plan for reorganization of the Escuela de Artes y Oficios (School of Arts and Crafts). The Servicio also conducted a survey of technical training needs throughout Peru and planned a three-week training program for 49 directors of technical schools in Peru, in addition to the already mentioned six-week summer school for teachers of technical education.

The first course, under the primary direction of the Servicio, trained 34 directors from industrial schools for men, and 15 from industrial schools for women. The student-directors represented all regions of the country and were selected by Commander Romero.

The plan of studies prepared by Mr. Sullivan and approved by Commander Romero and the minister of public education included lectures and working committees on various aspects of technical and vocational instruction, with a six-hour daily schedule. Instruction was in the hands of Commander Romero and the specialists of the educational foundation, with the assistance of local technicians, while the Servicio prepared the instructional materials.

The summer school for the instruction of teachers of technical education, offered concurrently with the above course, drew student-teachers from the fields of mechanics, electricity, carpentry, agriculture, and feminine trades, with a majority from the latter group. The selection of students and instruction plans were similar to those of the directors course. However, the director of technical education had principal responsibility for this course, with the exception of the group of domestic science teachers who were instructed by Mrs. Corry, as *La Prensa* reported. The ministry furnished materials for the students and Commander Romero formulated the plan of studies and other details of administration of the course.

Rural Educational Programs

Upon recommendation of the Servicio, three rural education programs have been planned for Peru. One is for the Aymara speaking population in Ojerani, near Puno. A second is for an experimental rural school to be established for the Quechua speaking population in Tinta, near Cuzco. It is expected that the school will consist of a classroom, a shop with necessary tools and equipment, and a field for agricultural activities. A man trained in manual skills and a woman trained in health and domestic sciences will be assigned to the school. In these programs stress is laid upon health and sanitation, agriculture, literacy, and manual skills.

The final aspect of the three-way program is a project to train a selected group of rural teachers in manual arts and skills and methods of teaching. This phase is being pushed by Minister of Public Education Dr. Luis E. Valcarcel and Mr. Sullivan. It will be executed under terms of a contract between the Servicio and the Inter-American Development Commission.

The plan calls for the establishment in Lima of four consecutive quarterly courses in vocational education. Each course will train about forty students selected by Minister Valcarcel from all regions of the country on the basis of capability. The courses will all be conducted in the workshop-laboratory of the Development Commission, under the direction of Grace de Escardo, director of the commission's Peru field unit, and with the assistance of Truman Bailey, regional director for the commission.

Trained craftsmen from the staff of the commission's workshop will be supplied as instructors. The courses will provide for six hours instruction per day with 3½ hours on Saturdays. Part of the time will be devoted by the trainees to the making of certain equipment, models and materials to be used by the Servicio for continuation of the training program in the individual rural schools.

To facilitate the program the development commission has offered to make available the results of its three years of experimental work in Peru, together with research material, technical data, demonstration samples, mechanical equipment, tools and other installations. The courses are designed to afford the trainees a combination of better industrial ideas and practices, and better educational facilties.

On its own, but with the consultative assistance of the special representative of the Inter-American Educational Foundation, Peru is co-operating with Bolivia on mutual educational problems of the Lake Titicaca region, an identical geographic and demographic area divided by the international frontier of the two republics. A unified educational system is being developed for the Indians in this highland area, with health instruction and agriculture constituting the core of this new functional and co-ordinated rural education program of Peru and Bolivia.

The Peruvian delegation to the historic meeting last year which decided upon the unprecedented joint Peruvian-Bolivian education program for the Lake Titicaca Basin consisted of:

Julian Palacios, director of rural education and president of the delegation; Juan Francisco Daza, director of the Rural Industry School and secretary to the delegation; Leopoldo Astele Maravi, chief of programs for primary education; Jose Marroquin, school doctor for Puno Province; Fidel Flores, representative for the Minister of Agriculture; Jose Portugal, rural teacher supervisor; Maria Asuncion Galindo and Luz Diaz de Daza, director and assistant director respectively of the Experimental School at Ojerani.

Peru has done much on her own for educational enlightenment. Leaders in education have broken away from the classical formal pattern of education. Education is being functionalized. The 1941 education laws represent a new and more practical approach to educational problems, particularly as they relate to the Indian. It has been the purpose of the Inter-American Educational Foundation to lend assistance where needed in expediting the changeover to more modern, improved, and efficient educational methods.

THE MAKING OF A MAN

Leonard E. Schmidt*

Do not ever feel disgruntled
With what you think fate has in store;
If the other fellow's grass seems greener,
Perhaps it's 'cause he waters more.

You can't expect things to come easy,
The biggest deeds take lots of work,
And big things we can never do,
If little ones we often shirk.

Habits are formed while you are young,
By the simple things you do,
The paper you stoop to pick up,
A tidy workbench when you're through.

They all add up, and form the pattern
That makes us what we are,
And they determine whether we'll stand still,
Or if we are to go far.

So each day do some little good,
It's quite a simple plan,
And the little things will soon add up,
And make of you a man.

*Lincolndale, N. Y.

There are 80,000 miles of steel wire in the two main load-supporting suspension cables of the Golden Gate Bridge.

Apprentice School+School District= Improved Instruction

*Clayton E. Buell**

Discussions on the improvement of apprentice programs of instruction occupied an important place on practically every convention program of the American Vocational Association. At these conferences, it is pointed out that the apprentice system is superior in some respects in preparing a boy for a trade, while on the other hand, the vocational school had some advantages also. At the same time it is agreed that the problem at hand is not to decide which is the better program in the long run, but rather, since each is strong where the other is weak, to obtain co-operation between the two systems so that they will supplement each other. The important question is, "How can the strong points of one system be transferred to the other system so that the innate weaknesses of each can be reduced?"

As an answer to this question the Philadelphia school district has worked out an arrangement with the Philadelphia Navy Yard whereby several certified teachers, recruited from the regular day school staff of the Edward Bok Vocational School, have been sent into the apprentice school over a period of years to organize and to teach classes for students in various trades. This co-operative effort has been in effect since January 2, 1930, when one instructor was assigned to the Navy Yard apprentice school by the school district in answer to a request from the commandant of the Philadelphia Navy Yard. Since that time the staff has gradually increased especially during the state of the national emergency, until at present there are five regular and three temporary teachers from the school district permanently assigned to the apprentice school on a full-time instructional basis.

The apprentice and trainee school program is carried on by the group of related subjects teachers from the vocational school assisted by a group of shop instructors selected from among the shipyard mechanics in the various trades represented in the school program. The mathematics and drawing relating to the individual trades is taught by the related subjects teachers while the trade theory which supplements the actual work in the shop and ship is taught by the mechanic assigned from the shop.

This happy combination of teacher and mechanic results in a co-operative effort designed to produce a practical course taught by effective teaching methods. The shop instructor, in teaching trade theory, is able to contact a man who is trained and experienced in the technique of teaching, and is thus able to develop a trade theory course which is set up on sound pedagogical principles. The related teacher from the school district gains also in contacting a mechanic who is constantly in touch with the trade. He is able therefore to develop a course in related mathematics, related drawing, and related blueprint reading that gives the training actually needed in that trade. He is able also to make use of practical illustrations that arise from blueprints of the trade or those problems that come up from day to day in the shop.

*Edward Bok Vocational School, Philadelphia, Pa., and Navy Yard Apprentice School, Philadelphia, Pa.

Types of Training

The types of training given in the school have expanded to include many varied programs. Where once apprentice training was the only job of the apprentice school, now training is given to helper trainees, mechanics, semiprofessional employees of the design section, petty officers of the ship repair units of the U. S. Navy, indoctrination of new employees, professional employees of the design section, instructor training, and supervisor training. Each group receives training appropriate to the work for which they are being prepared. Of these, all except the last four have had the benefit of co-operation with representatives of the school district of Philadelphia in organizing and teaching the courses offered.

The normal apprenticeship of four years of forty hours per week on the job and in school has been shortened because of overtime hours during the war period to an elapsed period of about 26 months. Each of the four levels of apprenticeship requires 1362 hours; an apprentice can, by working overtime hours, accumulate these hours in about 6½ months. Each apprentice is given training in the school for one-half day per week. All subject material is based on an analysis of the specific needs of the trade and is made as practical as possible in order to give the apprentice a sound background for his trade upon which he can build his future and therefore the future of the Navy Yard. School studies consist of trade theory, related mathematics and science, and related drawing. Much time is given to the reading of typical blueprints used in the respective trades; an emphasis is placed on the practicability of all material studied.

Helpers are given training to help them obtain the skill necessary to be competent mechanics. The subjects given are trade theory, ship practices, related mathematics and science, blueprint reading, and related drawing. The classroom studies require one full day per week for a period of five or six months. The courses for different trades run different lengths of time; for example, the ship fitter trainee classes run five months, while the electrician trainee classes run six months. Other variations exist; each trade determines its own needs.

Mechanics are given training in order to upgrade them in their job. Good mechanics who had never before worked in a shipyard must be given training in affairs peculiar to marine work so that they can be effective in the Navy Yard. Poor mechanics must be given school training to speed up their progress in their jobs. In order to make the training as effective as possible it must be very closely connected with what the student is doing on the job, so again the reading of shipyard blueprints is emphasized. The course for mechanics may run from three months to six months at one full day per week.

Semiprofessional employees from the design section have been hired to do a semitechnical job in drafting. As time goes on and more and more technical employees are removed from service for various reasons, these semiprofessional employees must take the place of those who have left, in so far as is possible. This means that they must have the beginnings of a technical education; their present and future duties are analyzed and the school training is based on the discovered needs. For these people the school classes run for about three to seven months at four hours per week.

Petty officers of various trades in the ship repair unit of the U. S. Navy are trained in the Navy Yard in school and on the job. These men, many of whom are experts in their respective trades, are given classroom work to supplement their previous knowledge and are taught the marine aspects of the trade. Since these men may be assigned anytime to the course, and leave anytime their ship is ready, an attempt is made to establish a "rotating" course so that the student may join the class anytime and leave when he has been through the complete course once. This type of course is possible because the men already have a basic trade knowledge before they come to school, and because the program for each week is a unit in itself in so far as is possible.

Type of Instruction

Instruction is done on both a class front basis and an individual basis. Classes may have from 10 to 200 persons in attendance; the smaller classes permit much individual instruction and diversity of material, but the larger classes require group lectures supplemented by as much individual instruction as is possible under such conditions.

For large classes three large rooms (50 by 100 ft. and 50 by 50 ft.) are available, each equipped with large drawing tables upon which as many as 200 students may spread out large blueprints, and a raised platform with its accompanying brightly lighted blackboard for the use of the instructor. Lecturing done from the platform is facilitated by the use of a public-address system. After the lecture is finished, several instructors subdivide the class and give individual instruction as needed.

For smaller classes, 13 small rooms are used in which are either drawing tables and benches for related drawing classes and blueprint reading classes, or large tablet arm chairs for related mathematics and science classes. Classes in these rooms are handled in the customary manner.

The school is equipped with motion-picture projectors and a supply of sound motion pictures, plus slide projectors with appropriate slides. This equipment may be used in a large projection room made for the purpose, or in the classroom.

A well-stocked library of late technical books on various pertinent trades is available to instructors and apprentices alike.

Demonstration apparatus for classroom use is gradually being built up. Among this equipment is a model drydock equipped to show activities related to launching, etc., electrical demonstration apparatus for showing principles of electricity, model sections of an LST ship, models of ship's lines, etc.

There is plenty of textbook material available for such trades as machinist, electrician, sheet-metal worker, shipfitter, etc.

In certain other trades there are a few textbooks written for trade theory, and in many cases books in the related subject fields are practically nonexistent, and the instructor must prepare supplementary material based on his own experience in the trade. Much of this material is issued in mimeographed form to each student.

Number Finishing Courses

Back in 1939 when a scarcity of trained men was felt in the ship fitter trade the first group of men was organized into a class. Since that time other trades gradually felt the need of training and courses were organized accordingly. Some of these workers were trained in the Philadelphia schools, some were trained in evening classes in the Navy Yard, others were trained in the classrooms in the apprentice school. Table I shows the number of workers trained (in addition to the regular apprentice classes) in the apprentice school in classes where teachers from the Philadelphia school district helped in the training.

Table I

Type of Class	*Number Completing Course*
Technical	
Nomenclature of marine work	64
Design drafting	62
Design hull	17
Design machinery	33
Design machinery (Advanced)	19
Design electric	27
Mechanics	
Coppersmith	49
Pipe fitter	27
Trainees	
Coppersmith	64
Electrician	440
Machinist	965
Pipe fitter	15
Sheet-metal worker	622
Ship fitter	1854

The co-operative arrangement which exists between the Philadelphia school district and the Navy Yard apprentice school results in a school where the material presented to the students is functional to each trade and approved by the shop involved. The students are taught by instructors who have been trained to teach, in co-operation with mechanics who know their respective trades and who represent the interests of their shops. The school has sufficient facilities and is convenient to the shops and ships so that students and instructors may keep in close contact with the shop and ship. Such a program must result in superior training.

Prevocational-Technical Training—Technical Activity

*Lester E. Slothower**

Industrial-arts departments have been making a definite contribution to general education by the creation of real exploratory laboratories. These laboratories have given to those pupils who desire to continue work in industrial-vocational departments a good start in the development of elementary skills; skills in the use of common tools and machines and an understanding of some of the more common construction problems.

Good industrial-arts courses have been enriched by devoting time to informational units as well as to manipulative units. However, industrial-arts instructors generally have too little time to demonstrate the use of tools and tool operations, to check the workmanship of their pupils, and to introduce basic facts and directly related information. The presentation and discussion of much valuable related information is often postponed indefinitely.

New developments in industry and in industrial education bring new demands for more time for industrial-arts work.

Both the industrial-vocational and the industrial-arts departments must now give more thought to the need for the education and training of technicians who work on jobs which require more limited technical competency than that of the fully trained engineer and scientist, and less manipulative training than is required of the skilled mechanic. These jobs usually involve the carrying out of experimental or productive procedures which have been planned by the fully trained engineer and scientist.

Industrial arts and vocational education must help train for the increasing number of jobs requiring more technical experience and training than is now offered in the high school's vocational courses, yet not requiring engineering education.

It is difficult to achieve the aims of the current diversified type of industrial arts in the limited time generally devoted to it. Additional time must be had, and some of this time should be allotted to a definite study of *technical activities*.

There is a need for a time period aside from shop time to co-ordinate occupational information and to discuss industrial-technical activity. This is not meant to replace existing guidance programs or to discontinue the discussion of occupational and related information in the shop.

The national scope of industrial-technical activity should be studied in general together with specific local situations.

A list of job classifications which require some technical training should be presented and studied in related groups — or as *families of occupations*.

This will help develop a readiness of pupils to make a choice of type of work for a vocation. Furthermore, it will offer a chance to assist in preparing for vocations by arousing an interest in, and starting the study of, related knowledge and by the discovery of the necessary skills which are required in the various job groups.

A study of general technical activities will further the student's interest in modern industry and broaden his understanding of its materials, processes, and organization. It will lead to a better appreciation of the products of industry by creating a better understanding of the conditions of industry and by developing a sensitiveness to the well-being of industrial workers.

A study of *technical activities* should include:

1.[1] Classification of industries of national scope such as:
- Air transportation
- Aircraft manufacturing
- Automobile manufacturing
- Building construction
- Communications equipment manufacturing
- Electric power production and distribution
- Electrical equipment manufacturing
- Hydroelectric development
- Industrial chemistry
- Industrial electronics
- Iron and steel production
- Lumbering and wood processing
- Machine-tool manufacturing
- Metal mining
- Metal-products manufacturing
- Oil refining
- Petroleum and butadiene production
- Pulp and paper manufacturing
- Rail transportation
- Shipbuilding
- Telegraph and telephone communications service
- Textile and garment manufacturing

2.[2] Co-ordination of industry with instructional areas such as:
- *a*) Metals
  - Sheet metal — Bench metal
  - Machine operation — Foundry
  - Welding — Electroplating
  - Metal spinning — Fabrication
  - Industrial uses and products
- *b*) Woods
  - Cabinetmaking — Carpentry
  - Upholstery — Patternmaking
  - Industrial uses and products
- *c*) Plastics
  - Molding — Fabrication
  - Industrial uses and products
- *d*) Communication
  - Radio — Telegraph
  - Telephone — Television
- *e*) Transportation
  - Automobile — Airplane
  - Railroad — Water travel
- *f*) Planning and developing
  - Reading — Research — Discussing
  - Drawing and blueprint reading
  - Problem solving — mathematics and science
- *g*) Graphic arts
  - Printing — Papermaking
  - Map making — Photography
  - Bookbinding — Lithography
  - Etching — Screen processes
- *h*) Power, heat, and light
  - Steam — Wind — Electric
  - Water — Gas — Fuels
  - (Atomic power)
- *i*) Ceramics — *k*) Clothing
- *j*) Food — *l*) Shelter
- *m*) Recreational facilities
- *n*) Safety and industrial hygiene

3. Association with the materials of industry and manufacturing such as:
   - Metal — Rubber — Glass
   - Wood — Stone — Chemicals
   - Paper — Clay — Minerals
   - Leather — Textiles
   - Agricultural products and foods
   - Miscellaneous

4. Exposition of industrial processes
   - Mechanical — Thermal — Hand
   - Electrical — Chemical

5. Overview of industrial plants and manufacturing enterprises.
   - Plant construction, operation, and maintenance — Production
   - Organization — Sales
   - Research — Installation
   - Invention and design
   - Maintenance of product and service to customers
   - Development

6. Commentary on the maintenance of:
   - Hospitals — Public buildings
   - Commercial buildings
   - Apartment buildings
   - General manufacturing buildings
   - Enterprises such as: meat packing, food products, and dairies

7. Classifications of jobs needing vocational-technical training.
   - See pages 123–133, *Vocational-Technical Training*, United States Office of Education.
   - The *Dictionary of Occupational Titles*, 1939, U. S. Dept. of Labor, U. S. Employment Service, Supt. of Documents, Washington, D. C., can be used as a reference.

8. Development of complete job analysis
   - *a*) Qualification
     - Prerequisites
       - Education and experience
       - Technical knowledge and related general knowledge
       - Initiative
       - Skills and related skills
       - Physical requirements
   - *b*) Working conditions
   - *c*) Contacts and co-operation
   - *d*) Responsibility
   - *e*) Pay, security, and advancement
   - *f*) Social characteristics
   - *g*) Obtaining employment

The study of *technical activity* can be enriched by: lectures, individual and group reports, interviews with successful men from industry, visits to industrial establishments, motion pictures and slide films, radio, books and magazines — especially industrial and advertising bulletins.

The chief stimulating element in the study of *technical activity* will be the average pupil's own inquisitiveness and fundamental hunger to know *why*.

*Lemoyne, Pa.

[1] *Vocational-Technical Training for Industrial Occupations*, United States Office of Education.

[2] Industrial Arts and Vocational Education, March, 1941, used as a reference.

Industrial Arts and Vocational Education
John J. Metz, Editor

ENCOURAGE YOUR STUDENTS TO BE ALTRUISTIC

It usually is an easy job to sell any teacher on the idea that he or she should do something for a handicapped child. However, it is not the writer's intention to impose on the good nature or charitable impulses of the teacher but rather to enlist his help in preaching the gospel of giving aid to such organizations as the National Society for Crippled Children of the U. S. A., Inc., Elyria, Ohio, or the National Foundation for Infantile Paralysis, Inc., 120 Broadway, New York 5, N. Y.

The first mentioned of these organizations was organized in 1921 and has been working ever since at developing a program which would bring not only medical aid, hospitalization, and treatment to the little sufferers, but also to give them opportunities to take part in vocational guidance and vocational training programs that are offered to the other children of our land.

In the 25 years of its existence it has exerted its influence in the formulation and adoption of state laws aimed at physical correction and vocational rehabilitation.

The present efforts of the organization emphasize the necessity of locating the crippled children in the community so that they can be given clinical diagnosis, physical correction by therapy, and/or surgery, adequate academic and vocational training, proper recreation and social adjustment, and eventual placement in jobs where that is feasible and possible.

The National Foundation for Infantile Paralysis has similar objectives, although there is some difference between their work. Both of these organizations are giving the people, and that means young and old, a chance to practice charity.

What a fine lesson to set before our students, to give little sufferers a chance to overcome their dreadful handicaps.

When the time comes to help these two and other similar organizations, get behind their efforts and do a real selling job in your classes. You, your students, and our country will be the better because of your efforts.

Don't forget the dates for the March of Dimes effort — January 15 to 30, 1947.

COLOR AND LIGHT

The war experiences have shown America much that will be helpful in the future years in the way of improved methods of production, better working conditions in our factories, better use of man power, and the better utilization of whatever workingmen may have to offer, be that little or much.

Studies made at the Pittsburgh Plate Glass Company paint division during the war years demonstrated conclusively that the colors used in the shop on walls and machines exerted a definite effect on the workers and in that way influenced not only the output but also the health and happiness of the employees.

According to this study, substituting attractive pastel shades of green, yellow, beige, rose tan, and other colors on the walls for the grays, maroons, browns, and whites previously used in the shops brightened the working areas for the employees, increased production, bettered safety conditions, and improved the well-being of the workers.

A similar study on the application of the principles of color dynamics in a Home for the Blind at Brooklyn also showed that the color of walls and equipment in the workshop helped the blind workers in their differentiation of the various objects. Of course, it must be remembered that some of these workers, while legally blind, possessed some slight power of perception, and it was to assist this limited visual power that these experiments were made.

It is quite interesting to hear that the experiments produced very favorable results. The work performed by these blind employees became very much better and accidents caused by bumping into objects were reduced considerably. These people with limited vision were affected by the bright colors and increased lighting much as are sighted workers when they are employed in cheerful surroundings.

The 35 foot-candles at the working level, commonly used for workers with normal vision were increased to 50 foot-candles for the blind.

These experiments should interest shop teachers because we, too, have problems such as are encountered in industrial plants. If color dynamics give improved results, in the industrial shop, why not make use of these findings in the school. Since the students in industrial arts and vocational education shops embrace youth with normal as well as poor vision, why not keep abreast of scientific findings and bring our school shops up to modern standards, and probably stimulate the more backward local industrial shops to do likewise.

REHABILITATION TRAINING SETS A PROUD RECORD

On September 12, 1946, President Harry S. Truman proclaimed that the first week in each year should be designated "National Employ the Physically Handicapped Week." For this year then, October 6 to 12 had been set aside for observing this practical and humanitarian objective.

The aftereffects of this war have left this world with many human beings who have been injured in such a manner that it almost seemed that they would be doomed to idleness for life.

Rehabilitation training, however, has put them back on a self-sustaining basis, and they can face the world with a cheerful self-confidence which their handicaps scarcely seemed to warrant.

A recent survey by the Department of Labor shows that physically handicapped workers are adaptable and make quick and satisfactory job adjustments. They are equal and often superior to the able-bodied in productivity. Their safety records are as good or better than those of fellow workers. They tend to have better records of attendance than other workers. They change jobs less frequently than their fellow workers.

It has been proved that practically every kind of job can be done well by physically handicapped workers who have been properly trained and placed. Amputees have performed well at many thousands of different kinds of jobs. The blind are capable of operating dictaphones, factory machines, vending stands, engaging in the professions, piano tuning, and many other occupations. The deaf work well as printers, rubber workers, painters, engravers, shipbuilders, and similiar occupations.

Vocational education can well be proud that it has such a prominent part in bringing about this transformation in the lives of these handicapped people. The success that has been achieved, however, should lead us to devise still better means of fitting these people back into productive and happy living.

Continuing Co-operative Training for Retailing

*Donald K. Beckley**

There has been much discussion within recent years of the relative merits of the various co-operative plans currently used in distributive education, and the general implications have been that for a given training situation some one of these plans would prove most suitable. Little emphasis has thus far been placed on the idea of offering some full-time instruction to co-operative students, and of extending the desirable features of a co-operative work program beyond the regular training period. Such a plan would provide an integrated and continuing training routine over a period of several years during which the graduate would be working full time. This article has been written to propose such a plan, and to suggest some of the advantages it would offer.

Obviously, it is difficult if not impossible to set up a *perfect* co-operative plan as long as there exists a conflict in interest between stores which want students to work when needed, and the educational institutions which attempt to set up co-operative schedules based upon student needs and the availability of their own faculty and teaching facilities. Hence the plan to be proposed here is suggested merely as a guide, since all features of it probably would not be practicable in any specific situation. It could be used by high schools training salespeople who later wish to assume more responsible positions, as well as for college-level executive training courses.

Full-time Classwork for Beginners

Many of the complaints by stores about co-operative students have concerned those new students who have had but little course work—or under an alternating block plan, perhaps have not yet attended any classes. Since they are new workers, they will quite naturally make beginners' mistakes. While such mistakes are normally expected from employees hired through the usual channels, higher standards of performance seem to be demanded of those who are selected co-operative students. Much of the unwarranted criticism of these new students could be eliminated if they were given an opportunity to learn more about what to expect on the job before beginning work. Hence, it is suggested that new salespeople be kept in classes full time for the first few weeks of the co-operative course so that they can be properly oriented to retail work. It is reasonable to believe that the new students would work out better on the job and would assimilate sales training in the store more readily than if this basic training had to be given concurrent with or following their first few weeks on the job.

Assuming that the students would begin their retail work as salespeople, the subjects to be taught in these first few weeks of orientation should include material on: arithmetic, business manners, job responsibility, organization of the selling department, selling principles, and possibly some business English. While there are other subjects which could be taught to advantage before a student begins store work, it does not seem practicable to include them because of the limited time available to be devoted to orientation.

One disadvantage of this plan for some students is that there is no opportunity to earn any wages during the first several weeks of the course. Since the student should be aware of this arrangement before beginning school and could plan it accordingly, it should not prove too serious a drawback. The most difficult problem here would be that of the educational institution in teaching so large a group of students at one time, especially if it were operating under an alternating block plan. It might be possible to release some students earlier than others on the basis of achievement tests on the orientation material, thus alleviating the crowded classrooms during the later part of the orientation period.

Returning to a Regular Co-operative Schedule

When the first few weeks of job orientation have been completed, it would then be desirable to revert to the co-operative plan determined to be the most suitable. Ordinarily there would seem to be no reason to change the co-operative plan because of the suggested orientation period, the only adjustment necessary being to rearrange somewhat the time at which the material is presented in some of the courses.

A Plan for Continuing Study

One drawback to the more complete effectiveness of many co-operative plans is the failure to carry on educational training after the regular co-operative course is completed. While graduates may be encouraged to improve themselves by taking evening courses while working full time, there are numerous reasons why they may not see fit to do so. One important reason is that the incentive of securing credit leading toward a degree or diploma may be missing. To those accustomed to earning academic credit for courses completed, taking work which does not meet any necessary scholastic requirements may seem hardly worth while. Since retail work demands so much stamina, it must be realized also that far more than the average amounts of ambition and physical energy are required if a graduate is to attend evening classes regularly while working full time.

Hence, the plan is proposed of including some evening courses as an integral part of a continuing training program to operate over a period of several years after graduation. If properly organized and presented to the students, such a plan could be far more effective than any system of evening classes in which the courses were entirely optional and not directly connected with the regular co-operative program.

As an example of how such a plan would operate, a high school offering a co-operative program in retailing from which the graduates secure jobs as salespeople could offer sequences of specialized courses for its graduates. For those interested in becoming buyers, courses could be offered in merchandising principles, fashion merchandising, possibly interior decorating, and other related subjects not presented during the co-operative part of the program. Those interested in management work in retailing could be given courses in store management, personnel management, and later perhaps retail accounting and expense control. Probably one course at a time would provide a sufficiently heavy program. Specialized courses could likewise be presented to those interested in small store management and other job areas.

Offering College-Level Courses

College-level programs preparing students for executive positions in retailing which offer courses in principles of merchandising, store management, and personnel management to co-operative students could supplement the theory taught in the co-operative classes with a series of courses in actual problems of merchandising, personnel relations, or management which have arisen in the course of the work the graduates are doing, or which they will soon encounter. Both high-school and college-level evening programs could be supplemented by courses including current material such as legislative developments affecting retailing.

Courses such as those suggested here could be given evenings at the educational institution if its location were convenient, or at one of the stores in the evenings or shortly after closing time in the late after-

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noon. The course plans should be made by the educational institution with the collaboration of the stores. Courses could prove most effective if taught regularly or at least occasionally by executives of the local stores. There would be a considerable advantage in having the material in any of the evening courses presented from the viewpoint of executives of different stores, assuming that their discussions of the subject could be effectively organized. This is especially true in the case of advanced courses involving management and merchandising problems.

Obviously, there are difficulties to be faced in the operation of a continuing program such as that briefly presented here. What incentive would encourage the graduates to continue to take courses after they already spent so much time attending classes as co-operative students? It would hardly seem fair to require attendance at such courses by holding up credit for the regular co-operative program until a specified number of evening, or *postgraduate*, courses had been completed. Many graduates go to other cities to work, and there are various other reasons why such an attendance requirement would be unreasonable. The most desirable plan would seem to be to present these evening courses as an advised part of the complete program rather than as a definite requirement, and to encourage students to make plans to take these courses by listing them in the school announcement along with the day courses. Specific credit for these evening classes could be given as graduate credit in the case of colleges and universities, or certificates of achievement in institutions not granting degrees. The greatest inducement to take the courses would be encouragement by the store executives themselves.

Another problem to be faced concerns enlisting the co-operation of stores in providing these evening executive training classes which often are handled by larger stores individually. If the stores in a community are to provide instruction for a program such as this, they must be convinced that their problems are sufficiently similar so that their promotional personnel could profit by learning from the executives of other stores. Working out such a schedule of classes and guest instructors from various stores might be quite difficult in some communities where there is little co-operation between stores. However, these and other problems are no more insurmountable than many others which have been solved successfully in the past in initiating work programs.

The idea of a continuing training program has broad possibilities in retailing as well as in other areas of co-operative education. The opportunity it provides for the educational institution to exert a helpful influence on young retailers over a longer period of time than is now possible is a feature which makes it especially well worth considering as a postwar step forward toward more adequate training.

Industrial Arts in the Elementary Schools

*Lewis E. Park**

Industrial arts on the elementary level in the public schools is a phase of the educational program designed to aid in the normal development of desirable citizenship, through experimentation and discovery in a world of work.

The general field of education has for its major objectives an intelligent understanding of the industrial arts, the social arts, the aesthetic arts, and religion, for in these cultural areas civilization has survived savagery, conquered a wilderness, and established a permanency of the social cycle, through the progressive attainment of human efficiency in the orderly adaptation of mankind to his environment.

The importance of industrial arts in the age-old process of social and racial expansion cannot be minimized as a contributing means toward cultural enlightenment, any more than to assume that each generation could of its own volition reconstruct the social heritage without technical knowledge of previous achievements in the complex art of efficient living. There is much barren waste between the invention of the two-wheeled chariot and the modern stratoliner, between the first use of gunpowder and the perfection of the atomic bomb, but the end of human ingenuity is not yet, for education constantly looks, not only toward the preservation of the culture, but also toward its improvement. The last two global wars have furnished convincing proof that national security in the future must reckon intelligently with new and revised formulas in the techniques of production, distribution, and manipulation of defensive weapons, all of which is not only a costly effort in a prolonged emergency, but also a doubtful expedient when hastily devised.

Technical skills for the limited few with noticeable talents are no longer safeguards to the American way of life, in either war or peace, because the industrial world is no longer confined to restricted geographical limitations any more than that of our military personnel, which has twice in the present century sought the restoration of peace in foreign lands. Educationists in this country are in unified agreement that peace through education is the logical approach to the coveted goal of human contentment, and in that commitment can visualize a universe in social harmony through the intelligence and understanding of free men in a free world.

Modern Educational Programs

Forward-looking schools with a modern version of individual needs as an integral part of the total social pattern have provided the means and the materials for experimentation in various areas of integrated handwork in the kindergarten and lower grades, to serve as a preliminary approach to formalized instruction in the industrial-arts course before graduation from the elementary school. In the determination of methodologies for the practical application of subject matter which normally finds expression in the teachableness of individuals, modern educational theories have for their first consideration the various developmental levels inherent in the transition of childhood from infancy to maturity, both chronologically and physiologically. Because of the wide range of individual differences among children, the elementary industrial-arts course must be selected and administered according to the social requirements of each particular group in their scholastic order of grade placement. Weighted emphasis is placed on generalization rather than specific training for an undetermined area of vocational specialization, the very uncertainty of which is an immediate determinate of practical methods and an obvious limitation of essential content.

The first impression of children in their initial contacts with reality is often distorted in a maze of confusion, and in many cases the industrial-arts shop in the elementary school is a challenging experience of the first magnitude to the mind of a beginner with meager knowledge of industrial procedure. To them a wholesome work experience in a planned program of constructive values is often the crossroads to an awakened attitude of observation and inquiry, an early respect for the responsibilities of maturity, and

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a genuine appreciation for a world at work, however the problems of immaturity are often individually solved along lines of least resistance, aided largely by imitation and imagery.

Constructive imagination is a quality of thinking which interprets facts for the solution of present and future problems, however the satisfaction of immediate childish needs may also be solved by a destructive type of imagination, through which the responses are detrimental to the individual as well as to society. Juvenile delinquency in all its varied ramifications is largely traceable to misguided judgments derived from a world of wishful fantasy, and the resultant problem of functional education is to provide a continuity of fact-finding opportunities of a constructive nature, through co-operative planning, group participation, and an individual study of social needs, in order to develop in children the art of thinking in terms of facts, instead of fantasy. An interesting phase of child life is the expressed admiration of a kindergartner at the net result of his own handiwork, the completion of a haggled horse head conveniently attached to a discarded broom handle, but of greater significance is the psychological effect of successful accomplishment as a motivating influence for further achievements. Inspiration is the dynamic force within the individual which has liberated mankind from the confines of his ancestors, and while comparative success is a matter of individual interpretation based on age levels and standards of achievement, some form of individual improvement must be recognized for its educational value in the learning process.

A continuity of successful experiences that satisfy the individual is often the difference between total rejection of personal responsibility and the ultimate attainment of social equilibrium, especially at the pre-high school level, when childhood in the general scheme of social ascendency is normally entering the preliminary stages of approaching maturity. Recognition of personal worth, emancipation from adult restrictions, and general acceptance among his peers, are the predominating characteristics of the boy in the industrial-arts shop, and behavior patterns induced by these inner drives require intelligent guidance in the significant problems of character development, personality growth, and the acquisition of desirable traits during the formative stages of preadolescence. An awakened impulse to create for the satisfaction of a dormant urge is the chief interest elementary industrial-arts students have in the work opportunities provided for them in many of the larger school systems, and through that latent enthusiasm for wholesome participation in a miniature world at work, the leadership of the future, at an early age is closely associated with productive methods and common materials upon which the continuity of civilization depends. The intelligent man power of any nation is its greatest asset, and training toward that end is an obligation on society.

Today's Requirements

At no time in human history has there ever been a greater demand for trained technicians, scientists, skilled laborers, or even philosophers, and also in the same lapse of chronological arrangement, there has never been a greater scramble for the immediate necessities of a military variety, than that of the past few war years in which the chief worry was, "Too little, and too late." Vestibule training was the adopted child of necessity in the armament program and the army supplied from that source was eventually victorious; however the incidental waste of men, money, time, and materials in the hurried preparation for defensive purposes is a mute challenge to educational leadership. When and where to start the industrial training program of the future is a national problem of deep concern. On the basis of educational expenditures in this country today, an adequate extension of the educational program in all of its related activities would no doubt cost less than the annual interest on the present war debt, and also there would be a corresponding increment of assurance that future generations would be better equipped in a national emergency, because of educational preparation long before the need of defensive mobilization. Reconversion to peacetime schedules and the economic demands of society on the individual in a changing world, suggests many opportunities for the immediate revision and expansion of the educational program.

Sensible living in a culture of increasing complexity in which the mechanics of providing food, clothing, and shelter, the fundamental essentials of meager existence, has through a continuation of progressive achievements been modernized through scientific research. The improvement of household appliances, the mechanization of formerly arduous tasks, and an extension of recreational facilities, have created new and intricate problems of individual readjustment to a shifting social pattern in which mankind is privileged to worship, work, play, and rest. Industrial arts has always been a contributing factor in the orderly improvement of living standards, from a crude beginning evidenced by the records of archeologists and climaxed in recent years by formalized instruction which is chiefly concerned with the economic activities involved in the production and the exchange and distribution of goods and services.

The complex art of modern living suggests many new and varied responsibilities for institutionalized training in the field of industrial arts as a major segment of the educational plan, in which the wholesome development of the whole individual serves to amplify the latent powers inherent in childhood. Attitudes of observation, exploration, and experimentation are normally crystallized through scientific appraisal of natural consequences and with competent guidance are a simplification of the learning process, which may begin in the life of the individual too late, rather than too soon.

The educational function of industrial arts in the elementary school is in no sense limited to the mass production of birdhouses, sailboats, or whatnots, but through selective channels predetermined for cultural values, aims to utilize the time of the student in a closer relationship with the realities of life, in the reconstruction of selected racial experiences, and to assist in the socialization of immaturity in one of its transitory stages.

How to Put the Home in the Industrial-Arts Shop

*Ray N. McFarlin**

How to put the home in the industrial-arts shop seemed quite a problem, and while studying it the industrial-arts shop kept getting into the home instead. It was finally concluded that the two were closely related and that the result of the research would be the same regardless of the title.

Many of the ideas discussed here are part of our own industrial-arts course of study at Cleveland, Ohio, while others are taken from courses of study developed in other cities, from references, discussion among my friends, or ideas expressed by myself.

One of the newest materials for home or school shop use is plastics. All over the country plastics are creating new hobbies and reviving old ones. Plastics are going over with a bang in schools and home hobby workshops. It is very easily formed, cut, and filed. It can be purchased in sheet, rod, bar, and block form, as well as in various forms such as, hearts, scottie dogs, butterflies, etc. The range of colors in plastic materials is very great. It can be cemented easily and takes a very high polish.

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Whether you are interested in plastics as a pastime or as means of making a little extra money, you are certain to be enthusiastic about them. As long as your imagination holds out, your interest in plastics will never wane.

Now that the war is over and materials are becoming more available, we will see great strides in the plastic industry. Here is a product that certainly can bring the home and the school shop close together. Plastics are workable almost as easily at home as they are in the school shop. Only a few tools are necessary to shape and form beautiful and artistic articles of this material.

Plastics are being used in many of the industrial-arts shops in the Cleveland public schools. It is a definite part in those schools which offer work in the craft shop for both boys and girls.

Many follow this interesting activity at home, and they bring the articles to the school for inspection.

Our own industrial arts in Cleveland offer a multitude of courses that closely relate the home to the school shops. A few of the ideas listed here are from the industrial-arts curriculum while others are from other sources.

Model Planes: The building of model planes, solid and flying models, has become an important part in industrial-arts activities in some schools. During the war, the model plane program did much to raise enthusiasm for this work. Model plane building is as interesting a hobby for the home as it is for the school, and the project may be worked on at either or both places with good results.

Model Building: With the increased availability of model kits and model plans, the building of all kinds of models, besides planes, is beginning to take a prominent part in model building. Here again the home can very well fit into the shop program.

Upholstering: Upholstering or reupholstering affords excellent opportunity for close co-operation between the home and the shop. The study of frame construction, upholstery material used, and the procedure to follow would certainly have definite consumer value.

Finishing or Refinishing: Either the finishing or refinishing of furniture or woodwork offers the opportunity for the boy to do the job in the school shop or apply his knowledge and skill gained there to the job to be done at home.

Minor Home Repairs: Repair a door that sticks, repair a drawer that sticks, repair a door lock, adjust a door catch, make or repair screens, replace a broken window, make minor electrical repairs, do cement patching, do plaster patching.

The foregoing list shows but a few of the odd jobs that need to be done around the home.

Bookbinding: This is a home and a school project. In the school bookbinding course, many of the projects made and procedures followed are of such a nature that they can easily be done at home. Books may be repaired in the shop or materials may be easily purchased outside to do the work at home. Many of the new projects made in the school shop such as small books and albums may also be made at home, and both boys and girls do equally well in this work.

Mechanical Drawing and Blueprint Reading: Jobs that may be undertaken are: Sketching the plan of your home and lot, the position of the house and garage on it in relation to each other. Drawing the floor plan of your home, placing the furniture on this floor plan. Study the relation of mechanical home features to good living. Study or prepare a set of plans of your present or future home.

All of the foregoing may be learned in the school drawing room and should be taught in a course of this type. Parts of it along with some *home mechanics* would make an excellent course for girls as well as boys. Activities of this kind would surely bring the home into the industrial-arts shop.

Shoe Repairing: The repairing of shoes would involve many skills and would definitely tie up the home with the shop.

* * *

In the Twenty-third Yearbook of the American Association of School Administrators, published in February, 1945, in the section, "The School as a Community Center," it says, "Often referred to as arsenals to democracy, the schools should not only work with available community agencies and groups, but also become community centers in and around which teachers, pupils, parents, and social, civic, and recreational agencies function during these times of stress."

"Certainly we, as administrators and classroom teachers, have been sadly remiss in our efforts to adapt and utilize the schools for community service and activities. Although representing an investment of many billions of dollars, school buildings are used on the average only about forty hours a week for nine months of the year. Based upon the assumption that they might be used to advantage from ten to twelve hours a day for twelve months, the actual use amounts to about 35 per cent of the total time available. In almost any city and hamlet any night of the year, one will find the public schools, dark, gloomy, unused piles of brick and mortar."

Schools can work with parents in building home-centered recreation through hobbies, clubs, parties, and small group activities. Schools are being opened to young people weekday evenings for dances, games, discussion, shopwork, or artistic pursuits.

In postwar building programs, school administrators and boards of education should be certain that school property is planned not only to meet the school program but to meet the needs of a community program. Rooms for shops, crafts, sewing and club activities should be available for community use.

"Schools should be open afternoons and evenings, not only to children and youth, but to adults. Men and women should form the habit of coming to school to participate in constructive community projects. The schools should become centers where one may learn with hands as well as books."

An unusual significant development is the Shorewood, Wis., adult school program, where for the past 12 years more adults have attended the classes than there are children enrolled in the schools.

The "California School Code" in its "Civic Center Act" specifically provides for the use of school buildings and school grounds for all types of community programs. The adult program is general in nature, embracing vocational, academic, civic, literary, homemaking, health, and avocational education. According to the State Department of Education in California, approximately one out of every six adults in the state over 18 years of age attended these classes at some time during the school year 1941–42. During this time over 970,000 different adults had been enrolled.

There is a growing conviction in educational circles that profitable use of school buildings, too, is a tremendous force in stimulating good public relations.

Schools will more likely succeed in their dual task if they are keenly aware of the importance of community interest, understanding, and participation; if all the citizens of the community realize that the schools are the people's schools.

Worthy home membership is one of the cardinal principles of education. To have worthy home membership you should have the ability to:

1. Recognize quality, appropriateness, and value in industrial products of use in or about the home.

2. Proper care for industrial products within one's possession in order to retain the fullest measure of serviceability, particularly in: (*a*) caring for food products economically; (*b*) caring for and repairing clothing; (*c*) develop ability and resourcefulness which will function in the accomplishment of all; (*d*) keeping in repair the common things found in the modern home; (*e*) appreciate the skill and labor required to establish and maintain a home. (*f*) Make labor saving utilities for the home.

Carl Hamburger, supervisor of industrial arts in Cleveland, Ohio, several years ago prepared a "Tinkers Course in Home Repair and Upkeep" which proved very successful in the Cleveland area, in fact it was so successful that Mr. Hamburger had to call a halt in his teaching the course because of the time element involved. It was given to interested women's groups. The course received national publicity. The *New York Times* had an excellent illustrated article on the course at that time.

The course was primarily for women and the following is a list of jobs they were required to do to complete the "Tinker Course."

Job No. 1. Make an extension cord
Job No. 2. Make an electric iron cord
Job No. 3. Make a splice in a cord
Job No. 4. Replace a window pane
Job No. 5. To turn off outside faucets to prevent freezing
Job No. 6. To repair a flush tank
Job No. 7. To Repair a leaky compression faucet
Job No. 8. To replace a fuse
Job No. 9. To plane and sandpaper a wood panel: (*a*) open-grained wood; (*b*) closed-grained wood
Job No. 10. Stain and fill wood (open grained)
Job No. 11. Use flat paint (closed grained)
Job No. 12. Use shellac and varnish
Job No. 13. Use enamel
Job No. 14. To repair a sticking door lock and line up a match plate

Bringing the home into the industrial-arts shop was done very forcefully in this course. "Home Mechanics" courses of a similar nature, but not as complete, have been given to girls' classes in various high schools in Cleveland.

In the article "The Home Mechanics Laboratory" in the Chicago Public Schools by Louis V. Newkirk, excellent suggestions are made for tying the home and school together to meet the needs of the educational practices of today. The home-mechanics laboratory has incorporated the following changes in the traditional shop program:

1. The instructional content of the home-mechanics laboratory course is closely related to the problems of modern life in the home and the community.

2. Less emphasis is given to isolated tool processes and exercises, e.g., making joints and sewing seams without the practical application of these skills.

3. More emphasis is given to the educational growth of the child, and the projects are considered a means to an end rather than the objective.

4. The home-mechanics laboratory course is a regular and fundamental part of the school program, not a special subject.

5. Girls as well as boys are given an opportunity to work with the types of tools and materials which will enable them to meet intelligently the many mechanical problems which arise in the operation of the modern home.

6. Boys and girls are permitted to work with a variety of commonly used hand tools and construction materials typical of modern life.

7. Boys as well as girls need experience with foods and clothing. Boys have clothing to select and repair and food to select and prepare, just as girls do.

The program has been planned around four specific objectives:

1. To give consumer knowledge about the selection and use of the products of industry.

2. To develop handyman abilities with common hand tools and the use of the products of industry.

3. To promote the use of handcraft for leisure-time activities in the home.

4. To contribute to the development of the personality of the child and to further social objectives of general education.

The Chicago home-mechanics course fills a modern educational need resulting from fundamental changes in our industrial, economic, and social life during the past forty years. It is flexible so that changes may be made whenever new classroom experiences or problems in living present improved techniques.

In the Florida Curriculum Laboratory, Bulletin No. 10, "A Guide to a Functional Program in the Secondary Schools," an excellent list is given of suggested skills that might be taught in the industrial-arts field. The list follows.

Suggested Skills That Might Be Taught

I. *Auto Repairing*

A. Care of Body and Finish of Car
1. Washing a car
2. Polishing and simonizing
3. Cleaning windows and upholstery
4. Adjusting door catch and tightening hinges
5. Removing minor dents, body and fenders
6. Repainting with power sprayer
7. Touching up jobs with paint and polish

B. Care and Repair of Tires and Tubes
1. Maintaining proper air pressure
2. Repairing punctures and changing tires
3. Inserting boots and filling cuts in casing
4. Changing demountable wheels

C. Care and Minor Repairs of Cooling System
1. Tightening or replacing connecting hose
2. Tightening or packing water pumps
3. Replacing and adjusting fan belts
4. Flushing and cleaning radiator
5. Installing pump repair kits
6. Removing and replacing radiators

D. Care and Minor Repairs of Electrical System
1. Cleaning reflectors in head lamps
2. Replacing broken lenses
3. Changing and testing lamp bulbs
4. Replacing battery cables, cleaning and tightening corroded connections, applying grease
5. Testing and caring for battery
6. Tracing shortage and repairing same
7. Cleaning commutator, replacing generator brushes
8. Adjusting horn to blow properly
9. Removing, cleaning, adjusting, and replacing spark plugs
10. Filing, adjusting, and replacing ignition points
11. Replacing worn ignition wires

E. Maintenance
1. Changing oil in crankcase
2. Greasing alemite system
3. Greasing differential, transmission, oiling fan, generator, etc.
4. Refilling brake fluid cylinder, bleeding lines
5. Tightening brakes, relining simple models
6. Replacing rings, valves, and grinding same on simpler model cars

II. *Bicycle Repairing*

A. Hub and Brake Service
1. Replacing cones and bearings
2. Replacing worn spindles
3. Replacing worn brake parts
4. Installing new hub or brake
5. Washing and greasing parts
6. Replacing leather hub cleaner

B. Wheels and Tires
1. Replacing broken spokes
2. Truing up wheels
3. Replacing hubs spoke or rims
4. Patching tires and tubes
5. Replacing old tires

C. Sprockets, Chains, and Crank
1. Replacing any sprocket
2. Removing or replacing chain links
3. Replacing old chain
4. Washing old chain, greasing and replacing, dipping in paraffin
5. Replacing broken or worn crank
6. Replacing or repairing pedals
7. Replacing cones and bearings

D. Frame Forks and Seat, etc.
1. Straightening frames and forks
2. Replacing broken forks
3. Cleaning thoroughly and scraping
4. Repainting with spray gun
5. Replacing grips and handle bars
6. Welding broken parts if equipment is available
7. Striping

III. *Woodwork*

A. Simple Repair and Construction
1. Making and repairing rough ladders
2. Easing doors by planing
3. Building simple cabinets
4. Erecting shelves
5. Making simple concrete forms
6. Rewiring window screens and doors
7. Erecting cleats for coat hooks
8. Renailing loose moldings and door steps
9. Making stage scenery
10. Hanging pictures on the wall
11. Constructing playground equipment
12. Erecting a garage, chicken house, doghouse, fence, barn, porch, or making addition and alterations to a house, or repairing same. Repairing roofs, flashings, etc.

B. Simple Painting and Repair
1. Preparing and varnishing old floors
2. Making and replacing broken rungs
3. Gluing broken furniture and preparing same for refinishing
4. Preparing and applying white wash on wood or stone
5. Preparing surface and painting cement floors
6. Preparing old surfaces and repainting woodwork and windows
7. Preparing walls for paint or calcimining

C. Simple Plumbing Repairs
1. Replacing washers in faucets
2. Replacing pump washers and packing pistons
3. Cleaning drain traps, clogged toilets
4. Repairing garden hose

D. Simple Electrical Work
1. Replacing cords and end plugs on all home appliances
2. Cleaning commutators, replacing worn-out brushes
3. Doing simple wiring and making extensions safe

E. Simple Plaster Repairs
1. Cutting out and filling cracks
2. Lathing repairs
3. Patching walls or ceiling
4. Preparing plaster

F. Simple Repair and Replacement of Hardware
1. Replacing curtain rods
2. Replacing screen door spring, hinges, hooks, brace angles, checks, handles
3. Replacing loose and broken knobs
4. Repairing broken locks
5. Replacing coat hooks
6. Replacing window cords and weights

7. Replacing window fasteners and lifts
8. Replacing leaking toilet fixtures
9. Repairing farm machinery

G. Simple Concrete Work
1. Patching driveway and sidewalks
2. Drilling in concrete or brickwork.
3. Painting brick and stonework
4. Constructing ornamental lawn work, seats, fishpool, rock garden, birdbath

* * *

In *School and Society* for October 27, 1945, is an article by Loren Harrison of New York City. The article is entitled "Educational Values and Other Values of the Home Workchops."

Parts of the article are presented here and give us another view on the subject "How To Put the Home in the Industrial Arts Shops."

When the workshop becomes the hobby of the family or of the younger members thereof, a number of benefits results. Boys and girls are kept more at home, improving their skills and, at the same time, performing useful and often profitable work. By learning the proper use of tools and machinery, they are speeding up workshop projects they take at school and are preparing, possibly, for well-paid industrial jobs at the finish of the educational period.

In fact, a great many school-shop instructors are systematically encouraging students and parents in making home-workshop installations where it is possible as a direct aid to the educational process carried on in the school.

A movement that has gained headway in and around Warsaw, N. Y., gives the farm family a workshop that may be used in periods when farm work is slack, a time when the family can turn out salable articles for near-by stores, thus adding to the farm-family income.

Because of the war this nation has become "tool and machinery conscious" to an extent never known before and that it will have its effect upon postwar living is equally certain.

It recently has been predicted in the architectural profession that over half of all new homes built after this war either will have modern home workshops built into them, or provision will be made for their installation later by the owner. This is the result of certain factors related to the war and wartime conditions, and must, of necessity, arouse the interest of the educator. First, millions of people, young and old, and of both sexes, have not only become skilled in the use of workshop tools and machinery because of the war-production programs, but vitally interested in "making things"; second, school shops have greatly stepped up their work projects and broadened their scope; and, third, the great shortages of common household articles of wood, metal, and plastics caused by wartime dislocations have caused many families to make these things for their own use and, in many instances, to sell what they make for a good profit.

The vastly improved wood, metal, and plastic working tools and machinery, which have largely grown out of wartime needs, make it much simpler to install a modern home workshop than ever before. Machinery is lighter, safer to use, more versatile — even in the hands of the amateur.

Qualifications and Function of the Industrial-Training Staff

*R. B. Cribbs**

In the short span of the past five years, industrial training has undergone tremendous changes. As we look back on this period of transition, we can see three important shifts in emphasis which seem to adequately sum up the transformation. Before the war, industrial training was confined chiefly to the large industries with the main concentration being on manual skills and apprentice development. During the war, it became necessary to train large groups of people who had never worked in industrial plants before; this was a period of curriculum building in which classes were established for all members of the production organization. In the later war years, and up to the present time, we have come to realize the all importance of the individual — his thinking, feeling, aptitude, adjustment, motivation, and job performance. Our experiences under extreme pressure have brought home to us the fact that no business is more productive or progressive than the combined skills and morale of the people who compose it. Modern training does or should concern itself with developing these skills and building morale.

In the article on "Fundamental Objectives of Industrial Training," page 251, of the June, 1946, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, we listed the four major objectives for modern industrial training. Summarizing, they are: (1) strengthen the line staff organization; (2) improve the use of man power; (3) handle special problems, and (4) strengthen human relationships throughout the plant. These objectives cannot be achieved overnight nor can we make much headway with them, if we fail to practice sound techniques of education and administration. All this should be co-ordinated by a functional training department. Now, what qualifications and functions should the training staff possess?

First, if they give adequate attention to the five areas of education (executive, supervisory, supplemental, apprenticeship, and on-the-job) they should have knowledge of: organization and administration, fundamentals of labor relations, production organization, social psychology, educational psychology, tests and measurement, personal guidance, individual differences, adult education, vocational education, principles of group work education, methods of teaching, teacher training, economics, personnel administration, character education, curriculum development, and visual aids.

It would be ideal if the training director could have all of these qualifications himself. If he hasn't, he should make sure that some member of his staff is strong in the areas where he is lacking. Much of this knowledge can be acquired through formal education; but, as in most occupations, industry pays off on experience.

The Training Directors Association of Illinois is composed of men who have been employed as supervisors, personnel managers, teachers, public administrators, social service workers, salesmen, and engineers. A large percentage of these men have full charge of the training activities of their various plants and they are conducting these programs with fair degrees of success. Since people representing so many different occupations are directing educational activities, it might appear that the job isn't too demanding. However, it should be pointed out, the common denominators in this work experience, i.e.: (1) maintenance of records, (2) organization, 3) administration, and (4) getting along with people. All of these qualifications are essential. It is our feeling that the man with experience in the educational field would have an advantage — especially if he has had some work in industry.

Along with such knowledge and experience, members of the training staff should have the following personal requirements: intelligence and adaptibility, social consciousness, understanding, unselfish — will-

*Personnel Manager, Gerber's Baby Foods, Fremont, Mich.

ing to give credit to others, practical — down to earth, sincere interest in people, ability to work co-operatively, earnest desire to strengthen organization, pleasant — agreeable — friendly, honest — dependable — confident, clearness of expression, appreciation of the individual, and capacity for leadership.

On the basis of these demands, it would appear that the training staff member must be quite a formidable fellow. It is understood, of course, that men in vocational education should have similar knowledge and characteristics. Every training man, unfortunately, has his shortcomings, but it is to be hoped that they are outweighed by the listed qualifications. To be absolutely frank about it, a weakness in any one of, or group of, these areas will very definitely limit success. Full support of this statement is evidenced by a study of the general function of each member of the training staff.

Training Director

The major part of the director's job is to help supervision with their responsibilities and to assist them in developing sufficient skill to discharge these responsibilities. His specific duties are:

1. Co-ordinate total training effort throughout the plant — set standards with supervision.
2. Establish contacts with all members of supervision.
3. Plan, supervise, and administer training department.
4. Conduct regular training staff meetings.
5. Conduct individual interviews with assistants.
6. Attend management meetings,
7. Determine training needs — surveys (records and consultation).
8. Help organize programs for meeting needs.
9. Help handle all details in taking care of the foregoing (relieve supervision).
10. Write manuals.
11. Select and train instructors and assistants.
12. Co-ordinate foremanship and other executive development.
13. Attend conferences in the training profession.
14. Keep advised on current practices and legislation.
15. Publicize and sell the values of education.
16. Keep in touch with educational and government agencies.
17. Maintain records.
18. Issue reports on the progress achieved — evaluation.
19. Counsel individuals seeking educational information.
20. Establish and promote the library.
21. Work with educational committees.

In-Plant Training Supervisor

The in-plant training supervisor co-ordinates the on-the-job division of our program. He reports to the training director and works with supervision on all job training techniques. He gives special consideration to the job skill and attitude of all production workers. Specifically, his functions are:

1. Follow-up departmental job breakdowns.
2. Follow-up personnel inventory (merit) cards.
3. Follow-up and co-ordinate the progress of the job trainers.
4. Follow-up training timetables — meet needs with definite plan for training. Work out general plan with supervision.
5. Interview new help — evaluate results of interviews.
6. Formulate a training program for the job trainers which will be in line with departmental function. Work with supervisors.
7. Assist in the selection of new trainers.
8. Help to spot new and specific training needs (production, quality, safety, and personnel), assist in development of plan to meet these needs. Co-operate with supervisors, trainers, workers, and training division.
9. Encourage self-development of employees — convey suggestions and ideas.
10. Conduct group inductions.
11. Co-ordinate induction with introduction to the job.
12. Co-ordinate departmental training with the total plant training program — follow pattern of consistency — discuss problems with other training supervisors and training director.

On-the-Job Instructors

These men can make or break the job instruction program. They are responsible for the direct training of all people in their respective departments. They report directly to the line supervisor immediately above them and they co-operate with the in-plant training supervisor. While they may, in many cases, perform production duties in addition to their training assignments, they are directly entrusted with:

1. Providing on-the-job induction.
2. Providing on-the-job training.
3. Helping in the preparation of job breakdowns.
4. Keeping job timetables up to date.
5. Retraining old and new employees.
6. Providing follow-up attention.
7. Helping to minimize misunderstanding.
8. Helping to control absenteeism.
9. Assisting in preparation of personnel inventory.

Supplemental Training Supervisor

The supplemental division of our training organization requires the service of a man who can build a curriculum which will meet the needs of the company and the employees. He should be thoroughly grounded on the principles of education. Briefly, his functions are:

1. Consulting employees and supervisors on needs.
2. Discuss program content with them.
3. Train class instructors.
4. Supervise the instructional methods.
5. Assist in writing outlines and manuals.
6. Spot outstanding people.
7. Make all classroom provisions.
8. Spot needs for personal adjustment.
9. Work directly with governmental and educational agencies.
10. Co-ordinate the apprenticeship program.
11. Handle much of the detail of the personnel inventory.
12. Handle special detail assignments.
13. Work on absenteeism and turnover.
14. Work with safety and personnel divisions.
15. Keep unit costs and preparing budgets.

Class Instructors

Circumstances and nature of instructional needs determine the source of class instructors. Large companies find it equitable to bring in or develop full-time instructors for their various programs. Medium size or small plants find it more convenient to use supervisors or vocational men from the local high school. In the latter cases, the supplemental training supervisor has a special training job. Supervisors are not usually familiar with group instruction techniques and the vocational men are seldom aware of our specific production problems and vocabulary. We might say, at this time, that our experience with vocational men has been excellent — particularly with regard to shop math, pipe fitting, and blueprint reading. We have been assured by these men that the experience they gained in our plant has strengthened their understanding of industry's problems — a knowledge which undeniably will make them more effective in the vocational field. Part of their training consisted of visits to the shop on which they analyzed the special job problems and integrated them with the instruction material. Another significant phase was the follow-up procedure consulting with individual members of their groups right out on the job. The over-all function of class instructors is to:

1. Gather knowledge of subjects to be taught.
2. Help plan material.
3. Present facts to group members using all known teaching principles.
4. Advise supplemental training supervisor of all needs.
5. Maintain records of groups.
6. Help select textbooks and materials.
7. Maintain good relations with group members.
8. Visit men in shop — observe needs and use of information.
9. Help evaluate program.
10. Keep abreast of modern teaching techniques.
11. Plan lessons.
12. Stimulate in others the desire to learn.

We are not claiming that these qualifications and functions of a training staff are complete. We do feel that they represent a fairly adequate cross-section view of the demands on the group. Perhaps the most indispensable substance of the total program is the establishment of suitable working relationships with all the people who make up the personnel of the organization — top management, specialists, middle management, and workmen. Without the support, interest, and co-operation of all these groups, the training staff would be as useless as a wagon without wheels. The most damaging single mistake a training staff could make would be to set itself up as a group of experts. It is one thing to get all the pertinent facts and share them with people but it is quite another to dictate and preach to them.

In the final analysis, if the training staff can, in its daily operation, be guided by the timeworn democratic principle — of people, by people, and for people — it stands a favorable chance of realizing progress with the educational objectives.

Problems and Projects

GLASS TOP TABLE

N. H. POOLE

Emmerich Manual Training High School

Indianapolis, Ind.

This table is constructed of standard sized materials and the construction is so simple that it can be made in any shop. Mild steel should be used for all metal parts of the table. The bending and forming of the various parts can be done without heating the metal. Heavy window glass, plate, or an old mirror can be used for top, and the size of the angle iron frame varied to fit around the glass at hand.

The frame for the top is made of ½ by ½ by ⅛-in. angle iron. Lay out the desired sizes or the sizes as are shown on the drawing. Plan to have the splice come at the corner over one of the legs. Drill a 3/16-in. hole at the points of the miters, then with a hack saw cut along the marked lines. Now clamp the angle in the vise having the point of the miter close to the jaws of the vice. With a steady pull, bend the angle iron to a right angle; do not hammer as this will leave square and not rounded corners on the outside band of the frame. Continue to bend until the frame is complete. The joint should be welded or brazed. If the school does not have welding equipment, the job can be done cheaply at a garage or welding shop. Of course, it is possible to rivet a plate under the joint and complete the frame without welding, in which case, the joint should come in the center of one of the ends.

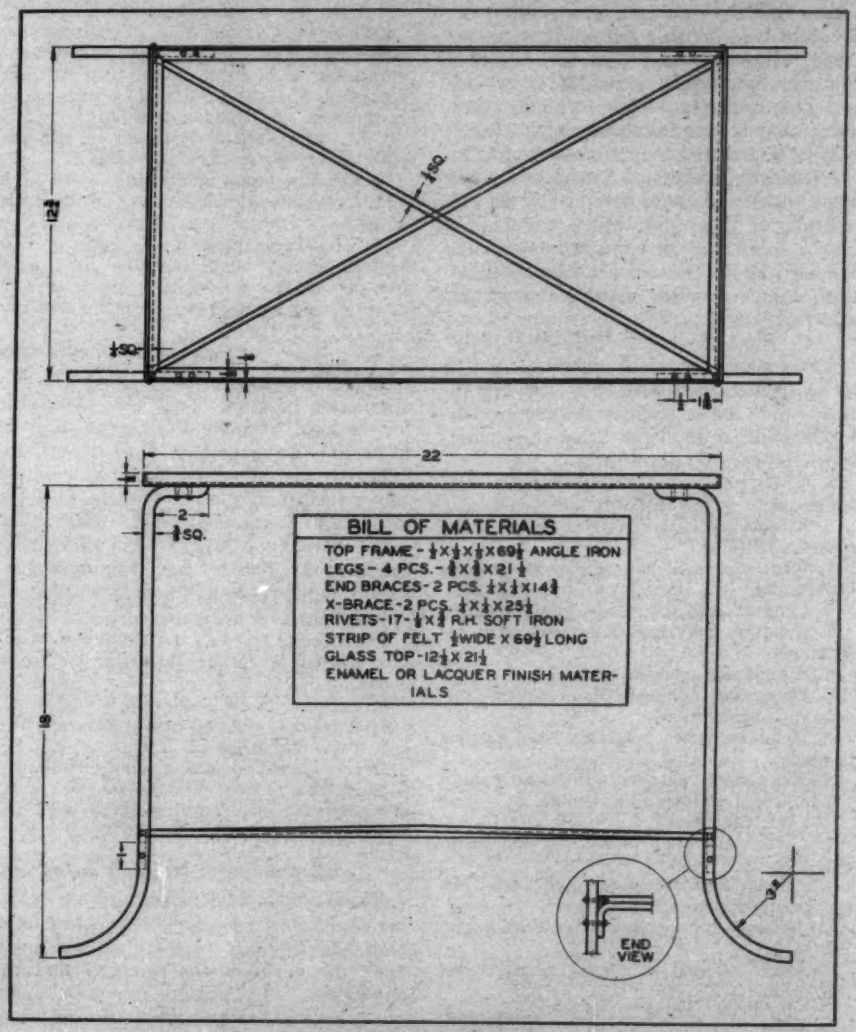
Next make the four legs using the ⅜-in. square stock. Bend the right angles at the top of each leg. This bending can be done cold, but heating in a forge fire or with the welding torch makes the work easier. Now make a simple jig for testing so that all legs will be the same in shape. Take a ⅞ by 6 by 20-in. board and lay out the full-size leg. Drive finish nails along the layout lines of the board and then bend the legs to fit this jig. Now round the top and foot of the leg with the grinder or with a file. Lay off and drill the four ⅛-in. holes in each leg according to the drawing.

Clamp the legs to the angle iron top and drill two ⅛-in. holes using the holes in the legs as guides. Rivet the legs to the top with ⅛-in. soft iron rivets.

The two end stretchers are made of ¼-in. square stock. To get the exact size to make the right angle bends, measure the space where the legs fasten to the top. Make the bends and drill the ⅛-in. holes. Rivet in place.

The "X" brace is also made of ¼-in. square stock. Measurements for exact length should be taken at the top of the legs. Bend the ends to the proper angle and round according to drawing. Drill the three ⅛-in. holes and rivet in place.

With a file and emery cloth, remove all sharp corners, burrs, and scales. If the table is to be used on a terrace, it should be given a white enamel undercoat and then a coat of white enamel. If it is to be used on a summer porch, it should be given a white undercoat and then enameled in colors to harmonize with other porch furnishings.


22
1 SQ.
1 SQ.
2
1 SQ.
BILL OF MATERIALS
TOP FRAME - ½ X ½ X ⅛ X 69½ ANGLE IRON
LEGS - 4 PCS. - ⅜ X ⅜ X 21½
END BRACES - 2 PCS. ¼ X ¼ X 14¾
X-BRACE - 2 PCS. ¼ X ¼ X 25½
RIVETS - 17 - ⅛ X ½ R.H. SOFT IRON
STRIP OF FELT ⅛ WIDE X 69½ LONG
GLASS TOP - 12½ X 21½
ENAMEL OR LACQUER FINISH MATERIALS
END VIEW

Glass top table

The glass for the top is next cut to fit the frame. Green, red, or black felt is cut in strips to fit along the ledge of the angle-iron frame. The corners of the felt are mitered. Now give the ledge a heavy coat of shellac and lay the felt strips in place. Place the glass on the frame and the table is complete.

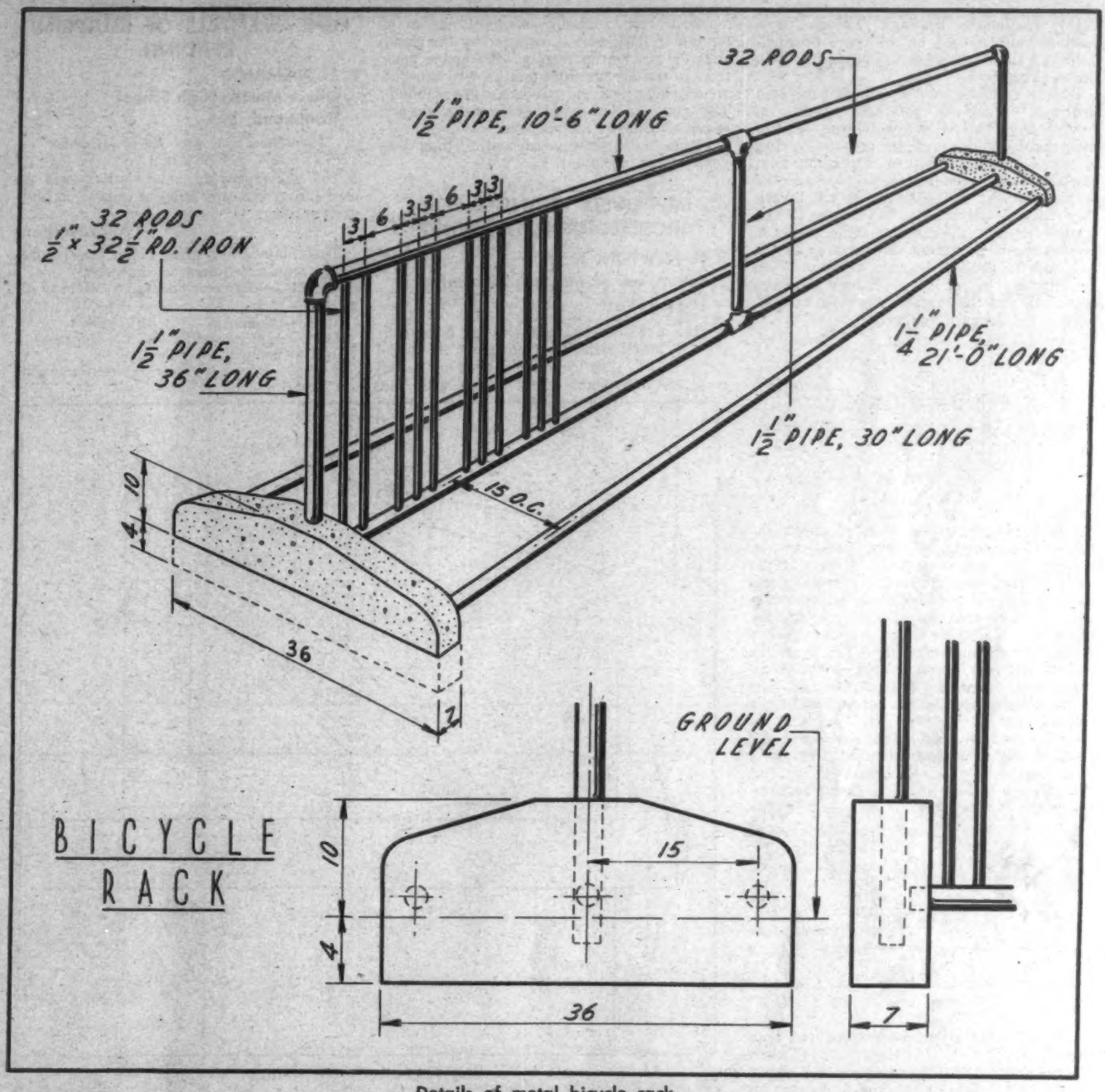
METAL BICYCLE RACK

RALPH S. WILKES

Principal, and Teacher of Agriculture
Elbridge Central School
Elbridge, N. Y.

Our school was in need of a new bicycle rack to replace the old wooden one made in our shop a number of years ago. This time we decided to make something more permanent of metal and concrete that would accommodate about forty bicycles. The project provided the boys in the vocational agricultural classes with an opportunity for practical application of such jobs as cutting and threading pipe, cutting round iron, drilling the pipe,

Metal bicycle rack



Details of metal bicycle rack

welding, construction of forms for the concrete ends, and the mixing and pouring of concrete.

After cutting the galvanized pipe it was marked off and ½-in. holes were drilled in the top and bottom pieces as shown in the illustration. The ½ by 32½-in. pieces of round iron were then fitted and welded in place. After the center part was assembled, the rack was set in place and braced with pieces of wood. At each end the soil was excavated in an 8 by 36-in. rectangle to a depth of 4 in., and the two outside pipes were set in place and the form fitted over them. These outside pipes may be either 1¼ or 1½ in. A one-to-three mix of concrete was poured, care being taken to work it down tightly against the form and the pipes. After the concrete became sufficiently hard at one end the form was removed and placed at the other end. The concrete should be kept covered with wet burlap for several days to slow the drying process.

To improve the appearance and prevent rusting of the ½-in. rods, the whole rack may be given a coat of aluminum paint.

The total cost of the rack was about $26.

FRICTION REDUCING GLASS BEARINGS

STANLEY J. DRAZEK
High School
Liberty, N. Y.

That glass bearings materially reduce friction is common knowledge. This article explains how glass can be incorporated into student built projects, thus resulting in prac-

tically frictionless bearings. Though these bearings can be used on all types of small projects, this article deals primarily with electrical projects.

Usually students have a difficult time constructing bearings so that their projects revolve freely. This is especially true of electrical projects designed to operate at low voltages. Friction plays an important role; power is lost to compensate friction and the project revolves feebly or not at all. Invariably students will increase the voltage to successfully operate the machine. This results in overheating or rupturing the windings in the coil, and the project becomes a failure. With the introduction of glass, friction becomes negligible, and the machine operates successfully at the designed voltage.

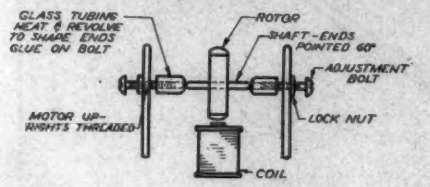


Fig. 1

Glass tubing can be obtained from the science department. Various sizes can be adapted for various projects. Most students have received basic instruction in melting and shaping glass. If need be, the science instructor's services can be obtained, though the operation is simple. Heating tubing over a bunsen burner and revolving it will cause the end to melt and form a smooth concave bearing. Score the tubing with a file and then break off the bearing to the desired length. See Figure 1.

In Figure 2 the bearings are shown mounted in a horizontal manner, adapting glass to the conventional type of adjustable bearings. Airplane cement will secure the hollow glass bearing to the adjusting bolt.

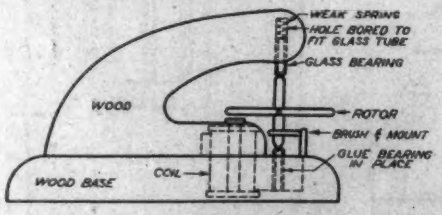


Fig. 2

Figure 2 illustrates self-adjusting glass bearings. This type of bearing is excellent where it is desired to remove the rotor for adjustments or for demonstrational purposes. The spring can be wound or one can be salvaged from discarded apparatus.

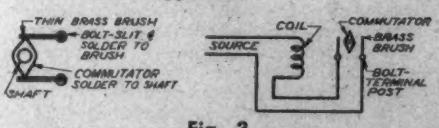


Fig. 3

A 6d or 8d nail will serve satisfactorily for the shaft. To point the ends the shaft can be chucked in the universal chuck of the engine lathe. This operation can also be accomplished by chucking the material in the chuck of the drill press and holding a mill file against the revolving piece. Finishing the points with fine emery and crocus cloth will reduce friction still further. An angle of approximately 60 deg. will serve the purpose.

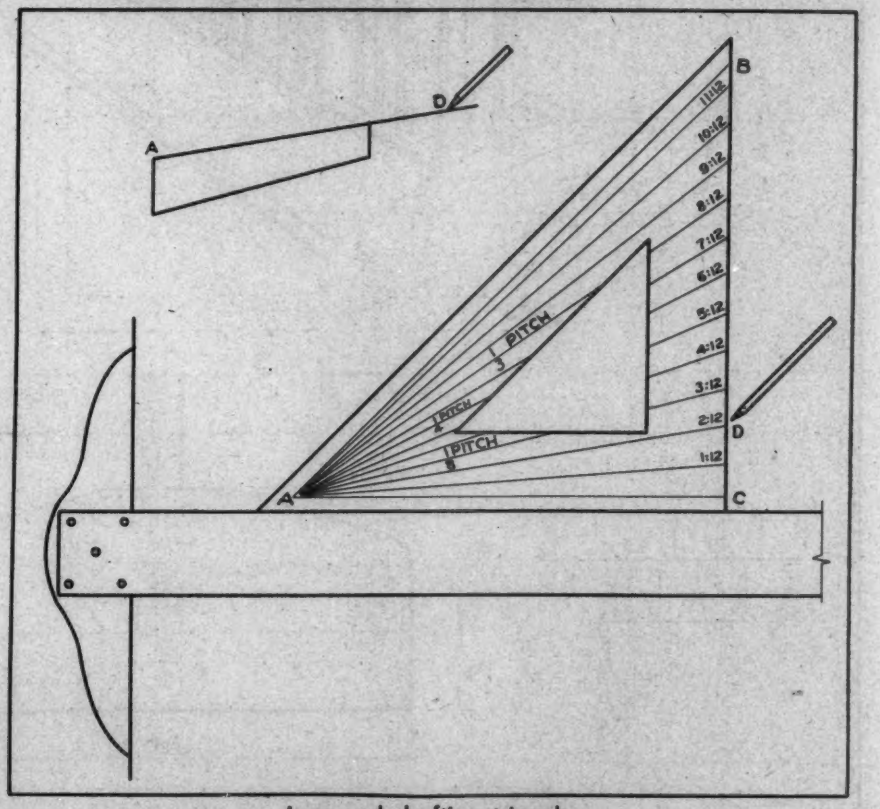
Figure 3 shows the double-cam commutator required when adapting glass bearings to a top motor. The shaft is insulated by the glass, and for this reason requires the double contact. In wound armature motors, two brushes are normally used and no changes are required. The same is true with synchronous motors where no brushes are required.

Figure 3 also shows a schematic wiring diagram of the top motor.

IMPROVED TRIANGLE FOR ARCHITECTURAL DRAWING

F. N. NEWTON, JR.
Supervisor of Industrial Education
Sharon, Pa.

Take a 45-deg. triangle and on it lay off lines in pencil radiating from point *A*, on illustration, to sides *BC*. These lines are to be made so they form useful angles with the side *AC*. Angles may be those such as 1 in 12, 2 in 12, 3 in 12, — 11 in 12; 10 deg., 15 deg., 20 deg., 22 deg., 30 deg. — 75 deg., etc.



Improved drafting triangle

With a divider point or some sharp tool scratch a groove on each pencil line stopping about 3/32 in. short of point *A* and side *BC* so that there will be no irregularities in the ruling edge. Also scratch in just above each groove the slope or angle that the groove makes with the horizontal line *AC*. Also scratch in the 3 standard pitch sizes. Ink in all grooves and angle measurements with black ink.

How to use the triangle. Suppose that from point *A* you wish to draw a slope of a sill which is 2 in 12. Place corner of triangle on point *A* from which the slope originates. With the pencil make a dot at side of triangle *BC* where the groove is marked 2 and 12. Remove triangle and connect points *D* and *A*. The result is the required slope.

FUNDAMENTALS OF BLUEPRINT READING

C. H. NIEMANN
Oliver Morton High School
Hammond, Ind.

(Continued from page 326 of September 1946, issue)

The accompanying abbreviations will be used throughout this series of lessons on blueprint reading.

Abbreviations

The abbreviations given below are the ones most frequently found on drawings.

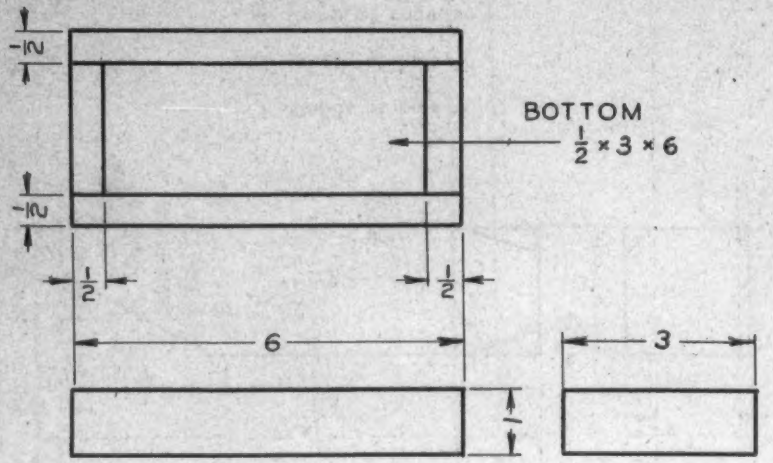
A.S.M.E. — American Society of Mechanical Engineers
ALM. — Aluminum
APP. — Approximate
BAB. — Babbett
B. & S. — Brown & Sharpe or American Standard Wire Guage
BR. — Brass
BTN. — Button
B.W.G. — Birmingham or Stubbs Iron Wire Gauge
BZ. — Bronze
C'bore — Counterbore
C. to C. — Center to Center
C.L. — Center Line
C'sink — Countersink
CIRCUM — Circumference
C.I. — Cast Iron
C.S. — Cast Steel
C.R.S. — Cold Rolled Steel
COP. — Copper
D. or DIA. — Diameter
DBL. — Double
F.A.O. — Finish All Over
FIL. — Fillister
F.T.S. — Forged Tool Steel
GA. — Gauge
GR. — Grind
HDN. — Harden
HD. — Head

(Continued on page 407. See problems on pages 405, 406, and 407)

Job 6. Complete the views by drawing in the missing lines. Answer the questions.

Purpose: To teach the use of visible and invisible object lines.

Note: See information sheets — 1 and 1-A for jobs 6 to 10.

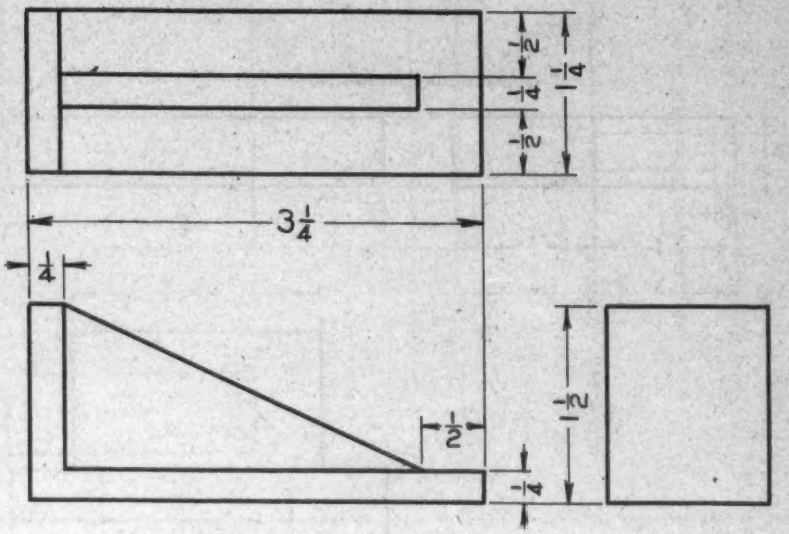


1. Thickness of stock =
2. Depth of box =
3. Width inside =
4. Length inside =

Your Name Date Completed

Job 7. Complete the views by drawing in the missing lines. Answer the questions.

Purpose: To teach the use of visible and invisible object lines.



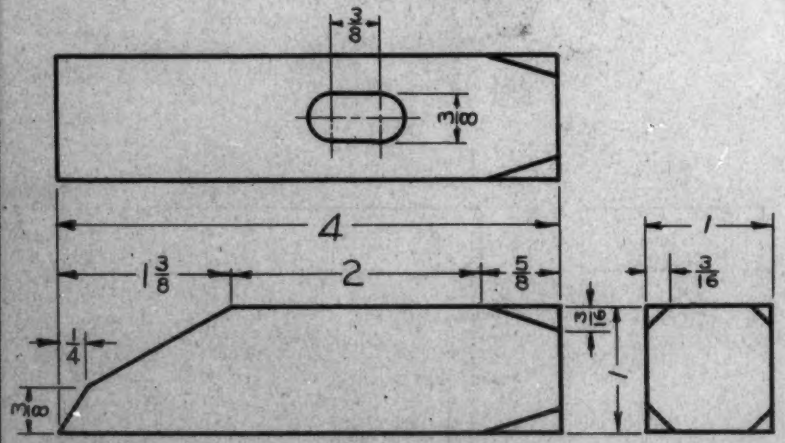
1. Thickness of web =
2. Width of web =
3. Length of web =
4. Thickness of stock =

Your Name Date Completed

Fundamentals of blueprint reading. C. H. Niemann, Hammond, Ind.

Job 8. Complete the views by drawing in the missing lines. Answer the questions.

Purpose: To teach the use of visible and invisible object lines.

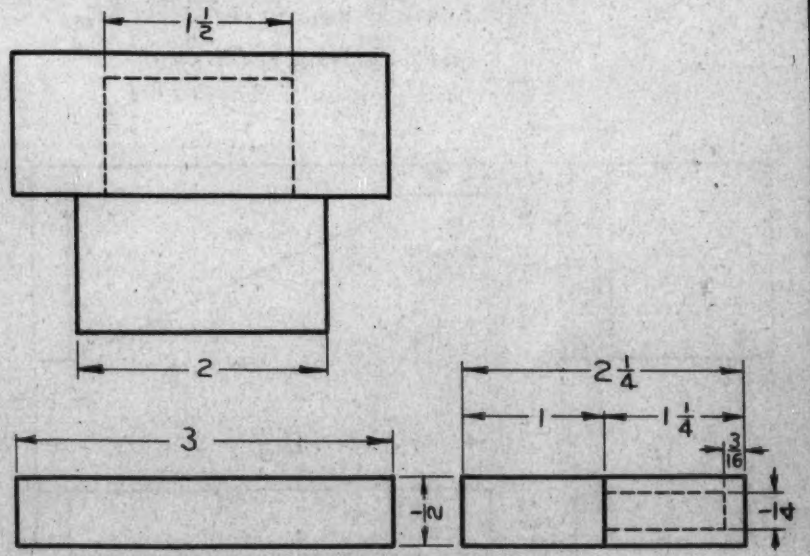


1. Radius of hole =
2. Length of hole =
3. Depth of chamfer =
4. Width of chamfer =
5. Length of chamfer =
6. Length of square section =

Your Name Date Completed

Job 9. Complete the views by drawing in the missing lines. Answer the questions.

Purpose: To teach the use of visible and invisible object lines.



Mortise-and-Tenon Joint

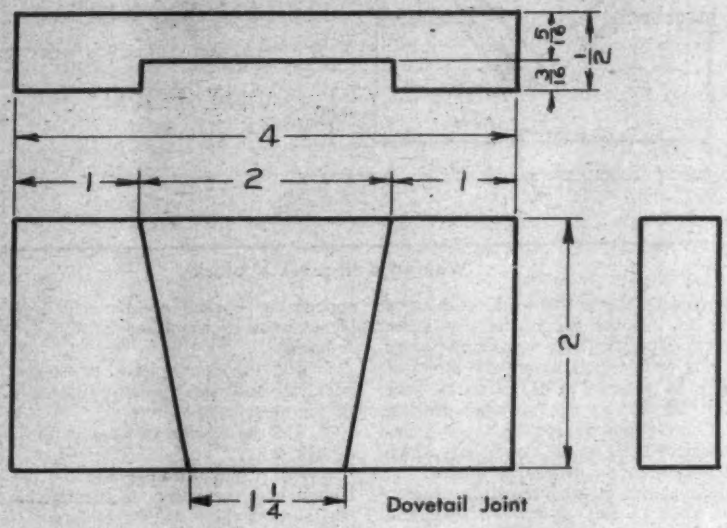
1. Thickness of tenon =
2. Width of tenon =
3. Depth of mortise =
4. Thickness of stock =

Your Name Date Completed

Fundamentals of blueprint reading. C. H. Niemann, Hammond, Ind.

Job 10. Complete the views by drawing in the missing lines. Answer the questions.

Purpose: To teach the use of visible and invisible object lines.



Dovetail Joint

1. Depth of dovetail =
2. Widths of dovetail =
3. Length of dovetail =

Your Name Date Completed

Fundamentals of blueprint reading. C. H. Niemann, Hammond, Ind.

HDLSS. — Headless
HEX. — Hexagon
H.P. — Horsepower
H.S.S. — High Speed Steel
L.H. — Left Hand
MCH. S. — Machine Steel
MAX. — Maximum
M.S. — Mild Steel
MIN. — Minimum
M.I. — Malleable Iron
MM. — Millimeter
N.C. — National Coarse
N.F. — National Fine
PH.BZ. — Phosphor Bronze
R. or RAD. — Radius
RD. — Round
R.H. — Right Hand
R.P.M. — Revolutions Per Minute
SCR. — Screw
SP.S. — Spring Steel
ST.C. — Steel Casting
STD. — Standard
SQ. — Square
S.A.E. — Society of Automotive Engineers
T — Teeth
T.S. — Tool Steel
THD. — Thread
U.S.S. — United States Standard
U.S.F. — United States Form
U.S.G. — United States Gauge
W.I. — Wrought Iron

PRODUCTION PRACTICE IN MACHINE-SHOP TRAINING

C. R. LINDSTROM
Senior High School
Salem, Ore.

The average high school machine shop is usually confronted with the problem of securing such projects as will lend themselves to a complete machine-shop training program. More often than not the training is given around the exercise type of project in which no particular interest is developed by the student, and the stock used becomes waste instead of a useful product.

The drill press project is one designed to remove these objections to some of the courses in machine-shop training practice. A complete, usable project has a number of advantages for machine-shop training:

1. It provides an *interest* to the student. He feels he is a part in the making of a standard product for himself or for his school.

Drill press as a project

2. It offers a means of reducing the cost of training in school machine shops, by providing a project of intrinsic value. Usually the students who make them are the purchasers. If not, the local market provides a ready outlet for the drill press illustrated herewith.

3. The project may be developed for production or *factory training practice*, incidentally lending itself to differences in training levels when used as a class factory-method project. A student may not have had practice on machining threads. This student may be placed on that phase of training in making this drill press. A student who has had this experience may advance to other phases of work without wasting time on items he is already familiar with.

4. The project provides a means of supplying *beginning training* to machine-shop students as well as supplying *advanced training practice* to students who are already on the job in the machine shop, or are on an advanced training level in their machine-shop work.

5. It provides an opportunity to correlate the work in the school shops. If foundry practice is provided in the school, the castings may be made in the school shop. If the school can boast of a patternmaking shop, this may also be tied in with the drill-press project. The drafting room might also be used for designing the project.

6. This project will also lend itself to developing the interest of the community in machine-shop training by offering a project that can be publicized through the local papers. It, therefore, ties the school machine shop more closely to the community.

A project such as the drill press is best described by a sectionalized drawing. One used by the author shows that this drill press consists of 53 separate items, many of which may be made or found in the school shop.

A number of aids are available to the machine-shop instructor who wishes to adopt the drill press as a school project. Where patternmaking and foundry are not a part of the school system, commercial firms may be prevailed upon to perform this function. Where such a contact cannot be made, there are educational services available that provide the castings for the drill press. In some cases, the companies furnish work sheets to accompany the castings. Shop instructors who are interested will profit by contacting the educational firms who supply these aids.

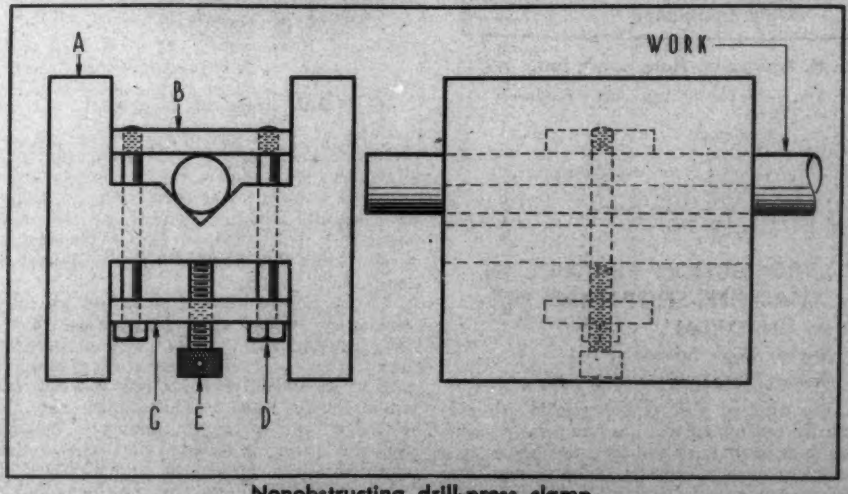
Companies organized for providing the educational facilities mentioned for the machine-shop project are few in number. A careful survey discloses that only two such companies exist: (1) Lewis Machine Tool Co., P. O. Box 116, Station A, Los Angeles, Calif.; (2) Vocational Industries Co., 2400 South Cottage St., Salem, Ore.

NONOBSTRUCTING DRILL-PRESS CLAMP

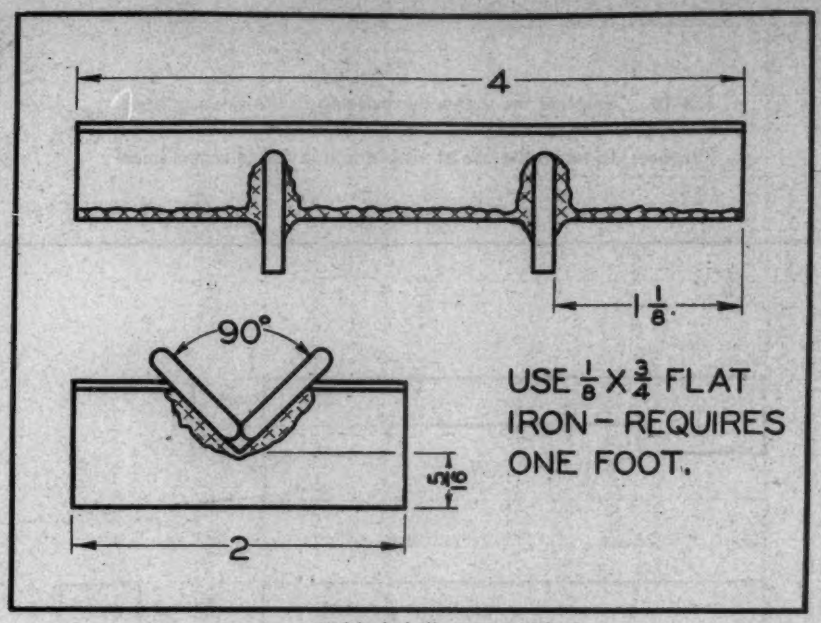
H. MOORE
Kirkstall
Leeds 5, England

The drill block shown in the accompanying illustration is a clamping arrangement that possesses real value. Standard blocks have a clamp that protrudes not only at the sides, but also projects above the work, making it impossible to use the blocks in any other than a vertical position. By having the work and clamping components within the limits of the block it is possible to use it on all four sides; and this is very useful when drilling, counterboring, countersinking, or taper reaming a number of holes in the same shaft which are located opposite or at 90-deg. angles.

The block shown is an interesting project. Part *A* is steel, milled out on two sides and V slotted. It is finished by drilling the holes for the clamp connecting screws *D*. The clamp *B* and strap *C*, together with tightening screw *E* complete the work. The reason for the unique clamping arrangement is to procure a tightening screw that never alters its own position no matter what the size of the work in the V. Thus, the head of the clamp screw will never protrude beyond the surface of the block.



Nonobstructing drill-press clamp



Welded drill-press V block

WELDED DRILL-PRESS V BLOCK

MYRON B. FARWELL
Niagara Falls, N. Y.

This simply constructed V block is small enough to be carried in the toolbox and sturdy enough to be used on the drill press or for layout work on round stock.

Procedure:

1. Cut the four pieces to length with a hack saw and true up ends with a file. Round the corners.

2. Cut the 90-deg. notches in the legs with a hack saw.

3. File edges forming the bottom of the trough and the edges of the notches in the legs so that there will be room for the metal to flow into the joints.

4. Clamp the two pieces forming the trough in an inverted position, spot-weld the ends, and weld the seam.

5. Clamp one leg in position on the bottom of the trough and weld. This is easier if the V trough is stood on end. Repeat with the other leg.

6. Turn V block over and drawfile the bottom of the legs until the V block will rest solidly without rocking on the surface plate or other true surface.

7. Oxidize with burned oil to get a finish that will resist rusting.

PROGRESS CHART

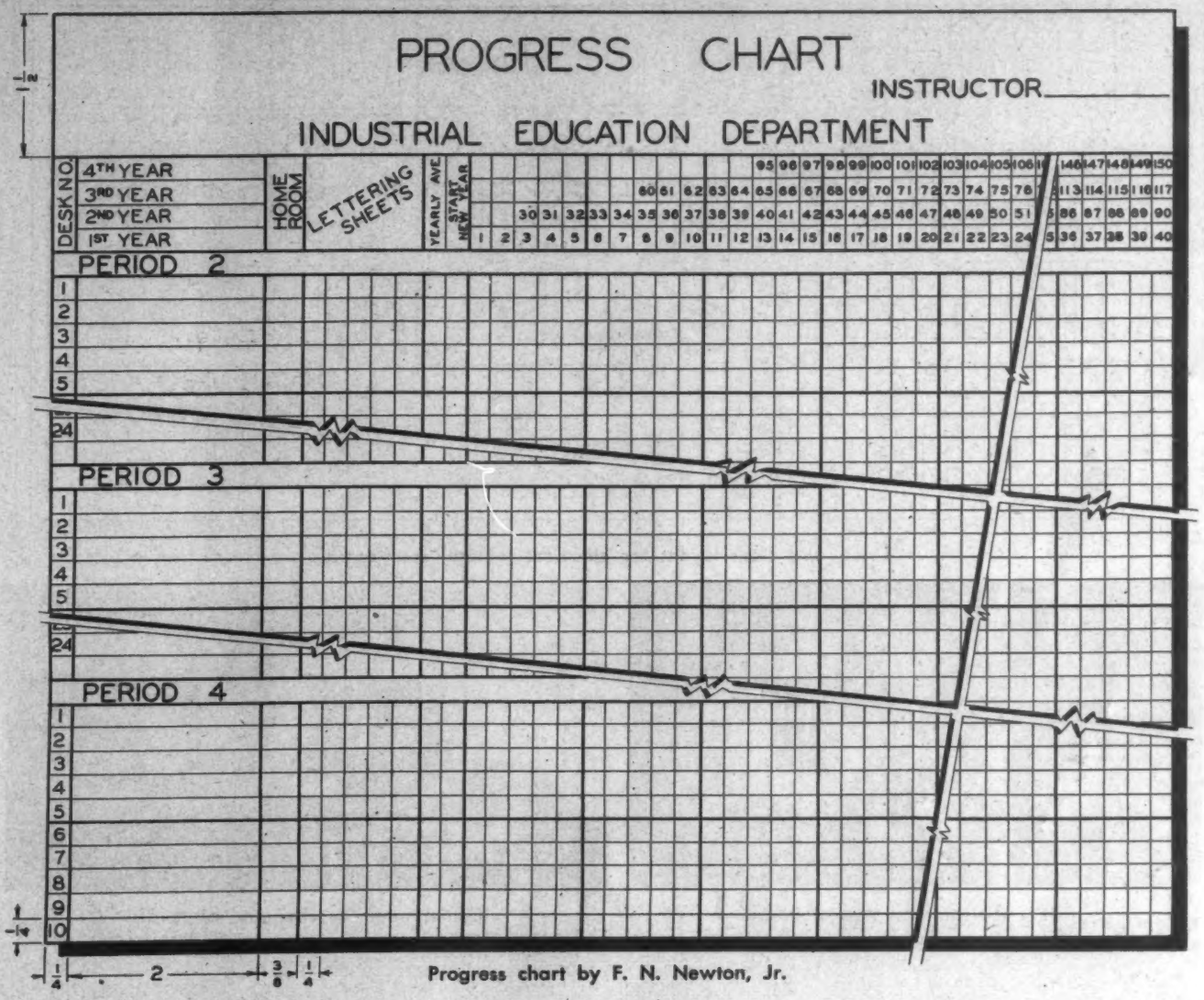
F. N. NEWTON, JR.
Industrial Education Department
City Schools, Sharon, Pa.

For a number of years we have found the progress chart, shown on page 409, to serve with satisfactory results in our mechanical drawing classes and in our shops.

In the drawing classes the student follows a set schedule of drawings and is required to turn in a certain number for the year's work. It's understood that the drawings are to be satisfactorily drawn in order to receive a passing grade.

Previous to establishing the chart, students were prone to skip drawings occasionally or to do the easier drawings first. They also liked to skip the lettering plates. With the use of the chart all of this was changed.

The chart is used in the following manner. The first four lines at the top are used for headings and numbers of drawing plates. The first column at the left is labeled *Desk Num-*



Progress chart by F. N. Newton, Jr.

ber corresponding to all the numbered desks in our drawing rooms. The next column lists the number of years it's possible for a student to take drawing. The next column is for the number of the home room from which the student is coming. The next column is for the yearly average the student attains. These charts are filed away each year so they can be used for reference anytime the record of the boy's standing in drawing or shopwork is wanted. The next column shows where the boy starts his next year's work should he enroll in drawing again. The remaining columns are used for numbers corresponding to drawing plates and are drawn in series of fives so they can be more easily counted.

Reading down from top to bottom in the second column at the left the students' names are placed, also in fives, with the various period headings corresponding to the class periods for the particular subject. After the students' names are inked in, we go over the block in which the name is placed with colored pencil corresponding to the number of years the student has taken drawing. At the bottom of the chart we show the legend. As an example, the first-year students will have the color pink. The second year, red, the third year violet, and the fourth year green. We also show a legend for each six weeks' marking period. The first six weeks yellow, second green, etc. When a student turns in a drawing, opposite his name and under the number of the drawing on the chart we color in the little block in the color corresponding to the color for the particular six weeks' period. The same applies to the lettering plates.

One will readily see that with the use of such a chart the teacher as well as the student know at all times just where they should be working. I have never believed in placing students' grades on progress charts but a chart worked in this manner has proved to be very satisfactory in all of our classes and students are in no way able to compare grades.

The chart we use is 22 by 29 in. and we have found it to be a very satisfactory size. The other dimensions are shown on the illustration.

CHECK THAT FURNACE IN YOUR HOME

Now is the time to have your furnace checked against wintertime trouble. Heating equipment in many households has been neglected during the war due to man power and material shortages. Here are the main points to check or have checked by a qualified furnaceman:

1. Are grates in good condition, not cracked or broken?
2. Is firebox sound, without cracks or leaks?
3. Are flues, smoke pipes, and chimney free of accumulated soot?
4. Are smoke pipes without weaknesses from rust?
5. Is smoke pipe tightly cemented into chimney with no loose joints between pipe sections or furnace?
6. Is draft system adequate to carry away fumes or gases?

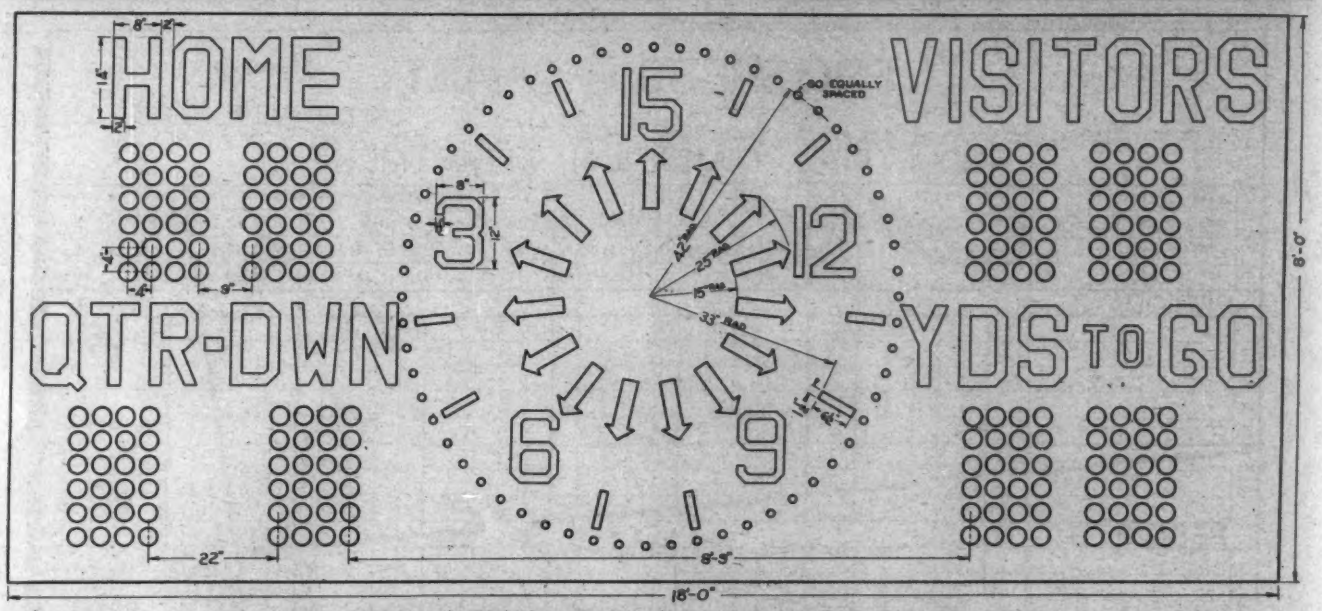
ELECTRICAL FOOTBALL SCOREBOARD

HENRY E. KNIGHT

Director, Trade and Vocational Education

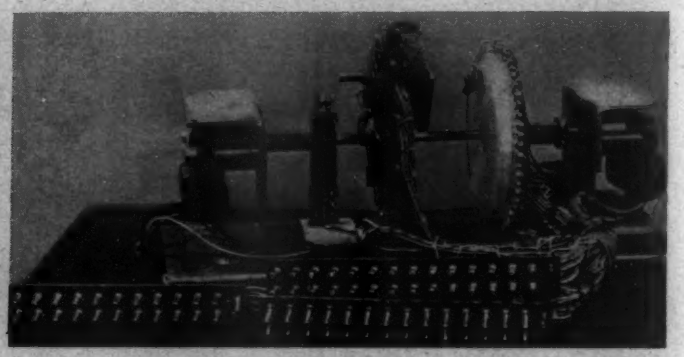
Charleston, W. Va.

A football scoreboard for Laidley Field in Charleston, W. Va., was manufactured by the students in the vocational division of the Stonewall Jackson High School. The design and engineering work was done by Cecil Gee,

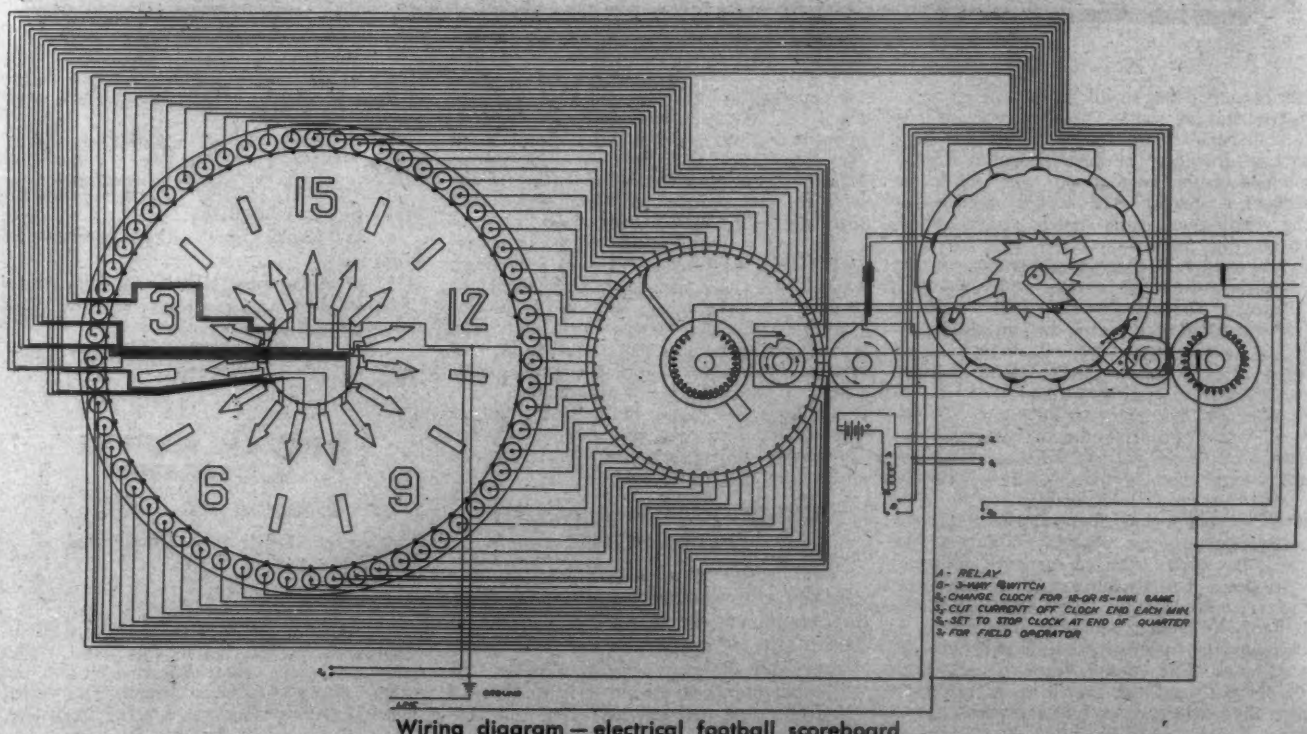


Lamp and clock layout for electrical football scoreboard

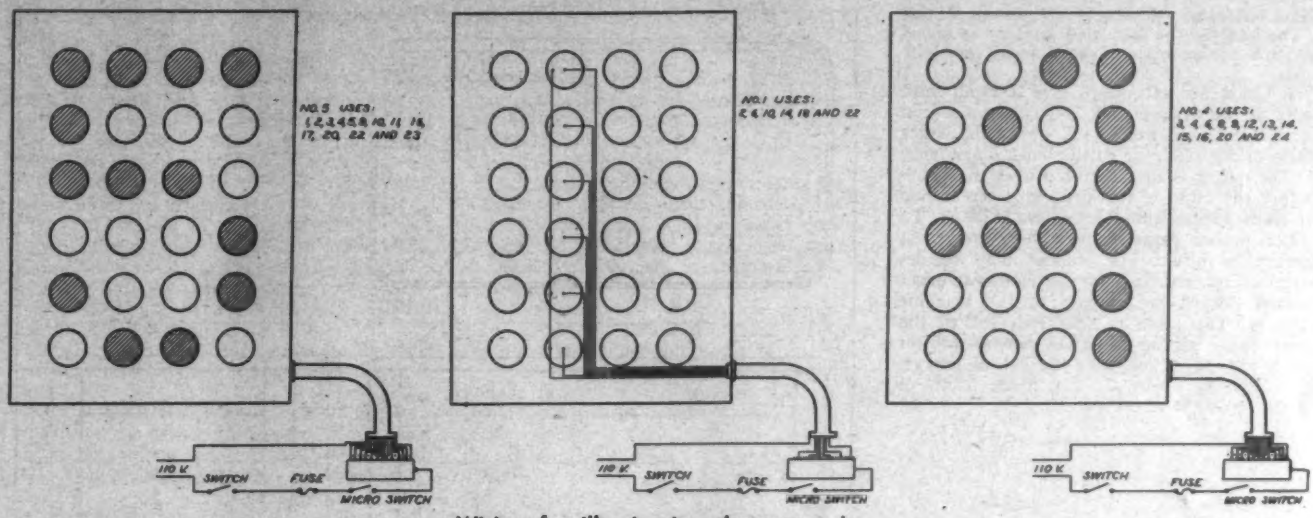
The electrical football scoreboard



Commutator for changing numerals


15
3
12
6
9
A - RELAY
B - 3-WAY SWITCH
C - CHANGE CLOCK FOR 10-OR 15-MIN. GAME
D - CUT CURRENT OFF CLOCK END EACH MIN.
E - SET TO STOP CLOCK AT END OF QUARTER
F - FOR FIELD OPERATOR

Wiring diagram — electrical football scoreboard



Wiring for illuminating the numerals

electrical instructor, J. A. Skiba, sheet-metal instructor, and M. D. Harper, machine-shop instructor. Each shop contributed its share toward the finished product. The football scoreboard, which is shown in the photograph, is 18 ft. long and 8 ft. high. It is housed in a cinder block building.

The scoreboard is operated by two students who receive instructions from the side line of the field by a two-way telephone line and can make changes in the score, yards to go, downs, quarters, etc., by turning of the appropriate dial. All units are self-illuminated, the lettering being opal glass with fluorescent lights back of it, and the various numerals consist of units of 24 thirty-watt incandescent lamps with a suitable commutator with 10 positions from 0 to 9.

The electric clock has no hands but has 60 thirty-watt lamps around an 8-foot circle for seconds. A ratchet switch containing 60 contacts for these lamps is driven by two synchronous clock motors. The minutes are indicated by arrows, one of which is always illuminated and points to the correct number of minutes to play. Each time 60 seconds have passed, a relay shifts the minutes to one number less.

In the construction of this scoreboard, the student morale and interest was extremely high. The sheet-metal students receive more man-hours of work per square foot of metal than on any previous job attempted. The machine-shop students, in making the commutators for changing the numerals, received excellent training in lathe and milling machine work. The electrical students were required to make all installations according to code requirements, and upon completion the local electrical union affixed their official stamp on the board as meeting all approved requirements. It was then inspected by the West Virginia Inspection Bureau and it was approved on the same basis as any other electrical installation.

SPECIAL HELICAL MILLING CUTTER

R. M. DYKE

Provincial Institute of Technology
Calgary, Alberta, Can.

1. The purpose of this project is twofold: first, to supply twist-drill models in quantity for use in drill grinding practice, and second, to serve as an introduction to spiral milling.

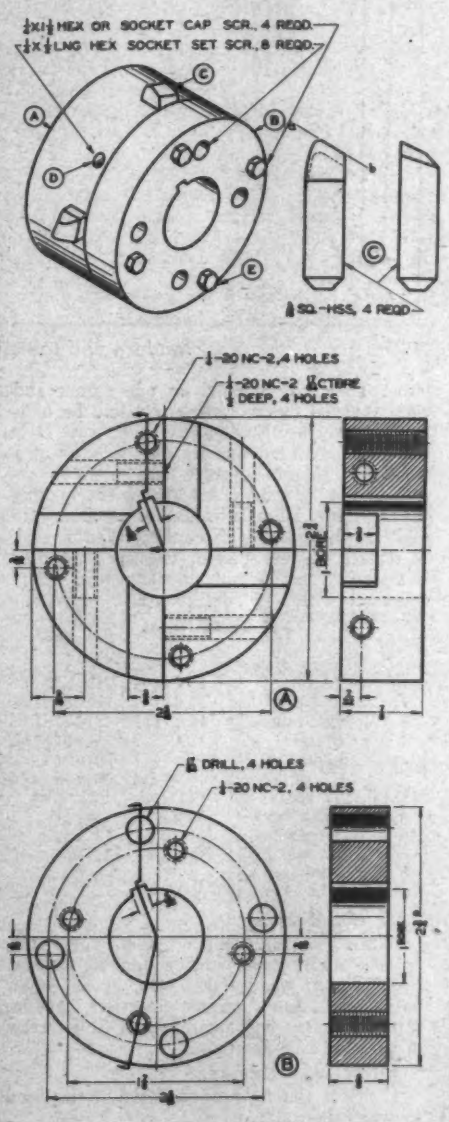

¼X¼ HEX OR SOCKET CAP SCR., 4 REQD.
¼X¼ LNG HEX SOCKET SET SCR., 8 REQD.
⅜ SQ.-HSS, 4 REQD.
¼-20 NC-2, 4 HOLES
¼-20 NC-2 THRU
¼ DEEP, 4 HOLES
⅜ DRILL, 4 HOLES
¼-20 NC-2, 4 HOLES

Fig. 1. Assembly and details of cutter

Although the term spiral milling is popular with shopmen, helical milling is the more correct term.

Every metalworking student must learn to grind a drill freehand, although on a production basis this, of course, becomes a machine operation. By using drill models made of cheap, cold rolled steel, it is possible to effect a considerable saving in tool steel as well as in drills.

2. Since the proper drill fluting cutter was not available, an inserted bit cutter, which gave complete satisfaction, was made up as shown. The regular 5/16-in. square high-speed tool bits, as used in the body of mild steel, provide a cheap, rugged cutting tool, and are easily changed or replaced. By making the slots a free ⅜-in. sliding fit, either the 5/16 or ⅜-in. size can be used, as setscrews on two sides take up all the play.

The cutter body was made in two halves to eliminate broaching and to maintain rigidity (see assembly and details in Figure 1). The teeth are radial, as shown; the four tool bits were ground freehand with sufficient accuracy to fit the flutes of a ½-in. commercial drill, with proper clearance behind the cutting edges. They were extended about ⅜ in. and then indicated to uniform height on a mandrel between centers. They could be ground to a template, if desired. Headless, hexagon-socket type setscrews are used to hold the bits in place. To compensate for the effects of spiral milling, the cutting edge *a–b* (Detail C, Fig. 1) of the teeth should be slightly convex to produce straight cutting lips at the drill point.

The cost of the cutter is many times less that of a regular form cutter, and in addition it may be made to serve a variety of purposes by inserting teeth of various shapes.

3. Conventional milling was used, and the tool stood up well at a cutting speed of over 120 f.p.m. and a feed of 2.5 in. per minute, flute, cutting oil used as coolant. With some two cuts of .100 in. each being taken on each sacrifice of surface finish, the feed and depth of cut could be increased considerably. Although the drills were made from ½-in. cold rolled steel, a ⅜-in. diameter would be large enough for the purpose intended.

4. Data for milling:

Machine . . . . horizontal universal miller
Dia. of drill . . ⅜ in.
Helix angle . . . 20½ deg. r.h. helix
Lead . . . . 4.170 in., lead of machine . . . 10 in.
Depth of flue = .8 of radius of drill or .200 in.
Min. width of cutter = .6 of drill diam. or .300 in.

Gears used were: drivers 64, 72; driven 40, 48.

The lead may be calculated as: Lead in inches = pitch circumference of work ÷ by tan. helix angle.

5. Gears are set up to give a right hand helix of the desired lead, and cutter mounted so that the work will rotate toward the larger angle of the teeth, or cutting edge *a-b*, Figure 1. The cutter is first centered over the blank before the table is swiveled, with center line of teeth passing through center of blank. To obtain proper shape of web, the cutter must usually be offset. The amount may be determined by trial. In this, the blank was offset inward toward the column of the machine .080 in. The table is next swiveled to the helix angle of the drill, so that the cutter teeth will be in line with the helical groove, as shown in Figure 2. The index plate, of course, is left free to revolve.

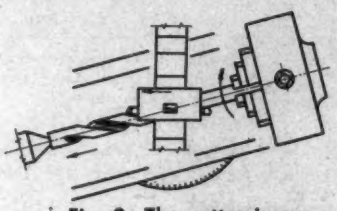


Fig. 2. The cutter in use

6. Two drills were made from each length of stock, previously accurately center drilled. A universal chuck was used in connection with the tailstock center, and the work reversed after one end was finished. The cuts were started a short distance from the tailstock center, the short ends with the center holes were later sawed off, and the lengths sawed apart. At the end of each cut it is, of course, necessary to stop the machine spindle with the cutter teeth clear of the blank, before running the table back. A jack used for extra support eliminates any chatter.

7. To make regular drills it would also be necessary to mill the margins, harden and grind. In that case, the blank must be set up with a slight inclination, about 2 degrees, to make the flutes somewhat shallower at the shank end for greater web strength at this point.

MODERN END TABLE

LYLE M. GARNETT

Milwaukee Vocational School

Milwaukee, Wis.

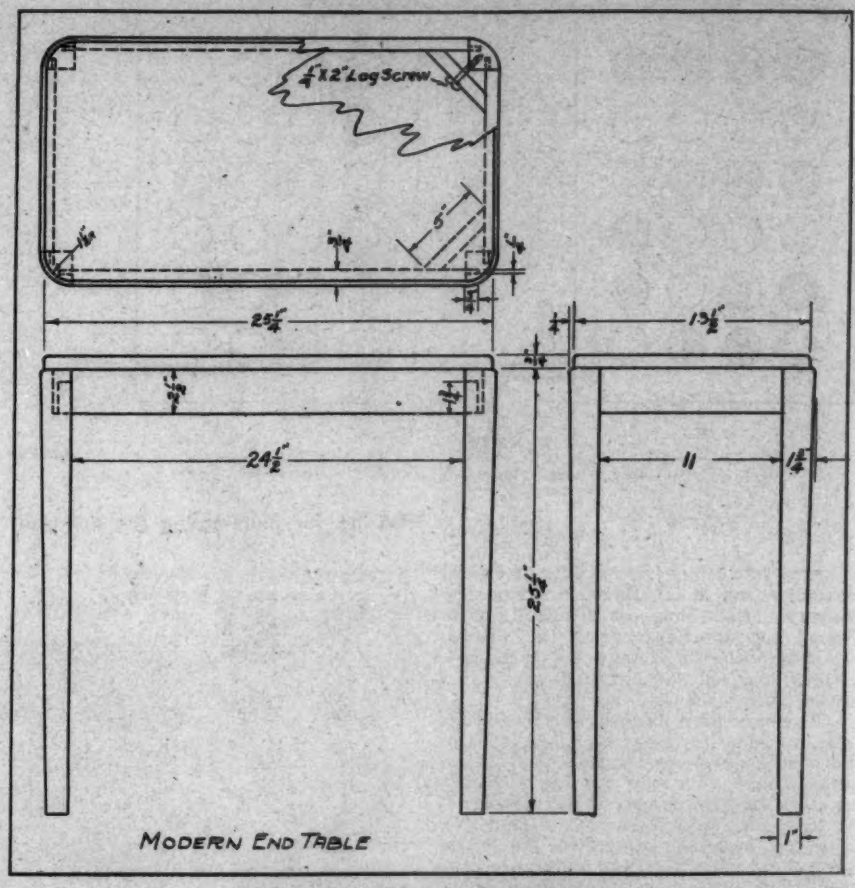
Purpose:

1. To make a table of modern design.
2. To use the jointer, circular saw, shaper, lathe, and the mortiser.
3. To make a barefaced tenon.

Technical Information:

Because of the shape of the legs on this table it is not possible to make the ordinary mortise-and-tenon joint. Usually the upper part of the leg is square and the conventional design of tenon may be used, but in this case if the tenon were placed in the center of the rail, the mortise would be so far toward the outside of the leg that there would be danger of the mortising chisel cutting through the stock. To remedy this situation the tenon is formed by cutting a rabbet on one side of the rail, leaving one face of the board without the usual offset. This will permit the mortise to be cut farther toward the inside of the leg and will make a stronger joint. This type of joint is known as a barefaced tenon.

The legs for this table are made on the lathe. They are rounded on one corner and they are also tapered, since it would be difficult to machine them in any other way. It is not possible to cut one leg on the lathe at a time and, therefore, great care must be exercised not to spoil a leg during the making of the table, since it would be necessary to make a whole set, or three more than needed, to replace the one spoiled. The end table may be made of oak, walnut, or mahogany, or any other stock that will finish nicely.



Modern end table by Lyle M. Garnett

BILL OF MATERIAL

No. of pieces	*Name of part*	*Size*
1	Top	¾ x 13½ x 25¾ S2S
2	End rails	¾ x 2½ x 14 S2SJ2E
2	Side rails	¾ x 2½ x ? S2SJ2E
4	Braces	¾ x ? x 5 S2SJ2E
4	Legs	1¾ x ? x 28¾ S4S Leave lugs on each end of legs
4	Lag screws	¼ x 2
16	Screws	No. 10 x 1¼ f.h.b.
8	Screws	No. 7 x ⅝ f.h.b.
8	Table-top fasteners	

Tools and Machines:

Jointer, shaper, caliper, ¼-in. auger bit, 3/16-in. twist drill, wrench for lag screws, circular saw, wood lathe, rule, brace, ⅛-in. twist drill, hand screws, mortiser, 1½-in. turner's gouge, try square, hand drill, screw driver, and bar clamps.

Construction Procedure:

1. Select the type of material to be used to build this table.
2. Complete the stock bill using the exact dimensions given on the working drawing.
3. Rough out all pieces of stock listed in the stock bill. Be sure to leave the pieces ½ in. longer and wider so they may be worked to the finished size later.
4. Plane one face of all pieces on the jointer if the stock is rough or out of true.
5. Plane one edge of all pieces on the jointer.
6. Check two adjacent surfaces of the pieces for the legs to be sure that they are perfectly square.
7. Reduce the legs to width and thickness by running them through the planer.
8. Lay out the mortises in the upper portion of the legs. Use a rule, try square, and pencil. Leave a 1½-in. lug on each end of the legs.
9. Cut the mortises ¼ in. wide either by hand or on the mortising machine.
10. Drill two 3/16-in. holes at right angles to each other in each of the 1½-in. lugs on the ends of the legs. These holes are not to cross each other since flathead screws are to be inserted in them and they are to be countersunk also.
11. Countersink these holes for flathead screws on the surfaces opposite the mortises.
12. Place the four legs together so the mortises are on the inside of the bundle, and clamp them together with hand screws.
13. Fasten the four legs together with flat-headed wood screws 2½ in. long. Remove the clamps when the screws are in place.
14. Drill a very small hole in each end of the bundle of legs to receive the spur of the lathe centers. This hole must be in the exact center of the bundle.
15. Mount the bundle of legs between the centers of the lathe and turn the taper on them. This bundle should be 3½ in. in dia-

meter on one end and 2 in. in diameter on the other.

NOTE: Be sure before you start the turning that you know which end has the mortises and also that you have indicated the length and position of the legs. The lugs must not be rounded because you are liable to strike the screws with the turning tools.

16. Sandpaper the legs with very fine sandpaper while the pieces are still in the lathe.

17. Cut the legs to the correct length with a parting tool while they are still in the lathe.

18. Rip the stock for the rails to within 1/16 of an inch of the correct width; then set the jointer to remove the surplus with one cut and finish reducing the stock to size.

19. Lay out and cut the tenons on the ends of the rails. This may be done with the dado saw.

20. Cut the slots on the inside of the rails to receive the desk top fasteners. These slots are usually made by dropping the rail onto the circular saw after it has been adjusted to make a saw cut ⅛ in. wide and ¼ in. deep, ⅜ in. from the upper edge of the rail.

21. Scrape and sandpaper the outside face of all the rails.

22. Make two sets of clamping jigs for each end of the table so as to hold the legs and the rails while they are in the clamps awaiting the drying of the glue. These jigs are made of small pieces of stock cut to fit around the legs so pressure may be applied properly.

23. Clamp one of the end sections together without any glue on the joints so as to be sure that the joints pull up. After this has been checked remove the clamps, apply glue to the joints and replace the clamp, and set aside while the glue dries.

NOTE: Apply only enough pressure to the clamp to draw the joint tight. If surplus glue should ooze from the joint wipe it off before it has a chance to set.

24. While the glue is drying on this section, it would be a good idea to work on the top of the table. The top should be made up of several boards and the glue must dry thoroughly.

25. Plane off one face of each board to be used in the top. Do this on the jointer.

26. Match these boards according to the grain of the wood. Do a very careful job of the matching so that when glued together the top will appear as natural as possible.

27. With a soft pencil or a piece of marking crayon draw a large triangle on the surface after the matching is done. This is to aid in getting the boards arranged in the same order the next time they have to be placed in the clamps.

28. Hold the faced surface of the boards against the fence of the jointer and plane off the edges of each board. Run the stock across the machine very slowly so as to make as smooth a cut as possible.

29. Set a pair of bar clamps or jacks for the width of the board to be glued. Place the boards in the clamps in their proper positions and tighten the clamps. Inspect the joints to be sure that they will fit together when the glue is applied.

30. Remove the boards from the clamps and apply sufficient glue to cover each surface of the joint; then place the boards in their proper order according to the large triangle previously drawn on the surface. Tighten the clamps sufficiently to draw the joints together.

31. Allow the glue to dry for several hours before the board is removed from the clamps and allow eight hours of drying before any machine work is done on the board.

32. Remove the end sections from the clamp and finish gluing the lower part of the table together using the clamping jigs to help apply the pressure to the legs. Allow the glue to dry several hours before the clamps are removed from the table.

33. When the glue in the joints of the top board has dried for a sufficiently long time, the board should be planed to ¼-in. thickness. This is done on the planer but be very sure that the surplus glue has been removed from the surfaces of the board before the board comes in contact with the knives of the planer. This glue dulls these knives very quickly.

34. Reduce the top to 13½ by 25¼ in., and round off the corners to a 1½-in. radius.

35. Set the shaper to make a cut that will round off the edge of the top as shown in the drawing.

36. Scrape and sandpaper the top if no drum sander is available; otherwise sand the top on the machine.

37. Fasten the top in place using at least two table-top clips for each edge of the top.

38. Sandpaper the table very carefully with a fine grade of sandpaper just before the finishing is done.

39. Drive a set of ⅞-in. gliders on the bottom of the legs of this table in place of casters so the table will slide across the floor easily.

40. Apply a finish which is suitable for this type of table and for the material used.

NOTE: Since this table is of the Swedish modern design and most furniture of that design is finished in a bleached finish, it would be in keeping with the common practice if this table were also finished with a very light bleached finish.

CENTERING AN ISOMETRIC DRAWING

L. JOHN COX

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Many of us who teach mechanical drawing have the students make isometric drawings. In my many years of teaching I have not found a book that describes how to locate the starting point of an isometric drawing so that it will be centered on the paper when the drawing is completed. It is true that we wish to have our students use their own judgment, but there is too much trial and error in placing an isometric drawing so it will look good. It is true also that it does not have to be exactly centered to look well, yet it is a good policy to teach the students to be as accurate as possible in all their work.

It has been my experience that if a definite rule is given for solving this problem, the student does better work. In any case, the main idea of the problem is to know how much drawing space the object will take so the spacing of the work may be planned, and where to start the drawing.

After trying several ideas, the one that is described here has been found to work satisfactorily. Figure 1 shows the drawing of the completed object centered on the paper. The problem before starting the work is to know where point *C* is to be located. This point *C* is the starting point where the isometric axis may be drawn, or where the corner of the object may be started. Figure 2 shows how the problem is solved.

On a piece of scrap paper draw line *EF* of any length, as shown in Figure 2. Place point *C* anywhere on this line. Draw *CR* at an angle of 30 deg., with the line *EF* equal in length to the side desired. Draw in like manner side *CS* equal in length to the other side. From points *R* and *S* drop perpendiculars to the line *EF*. Call one of these perpendicular lines *X* and the other *Y*, as shown in Figure

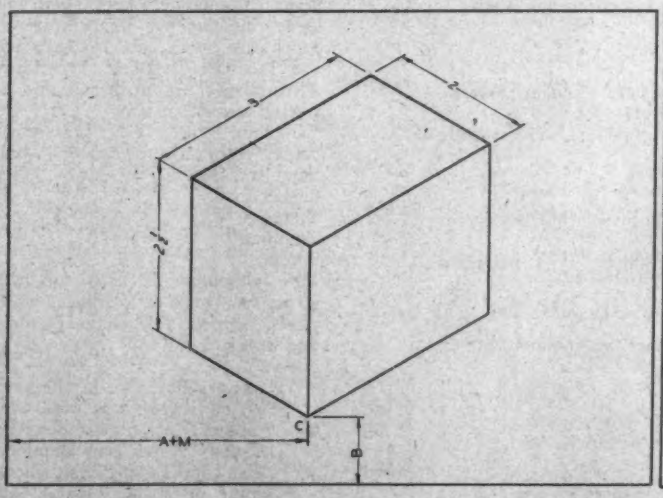

Fig. 1

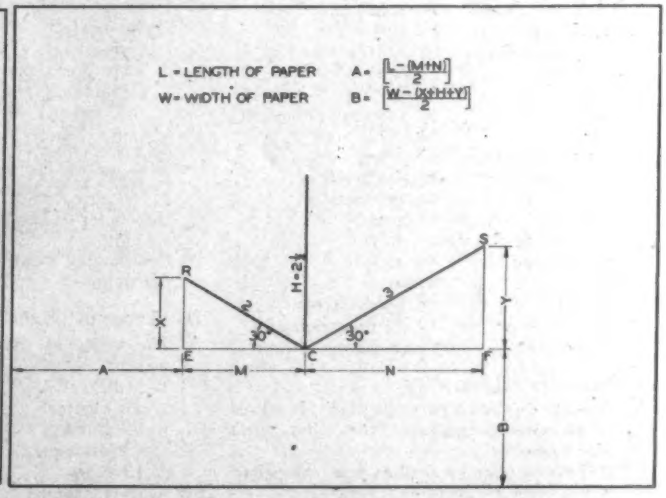

Fig. 2

2. Then from point *C*, draw a perpendicular line to line *EF*. Call this *H* and make it equal to the height of the object.

To find the vertical distance of point *C* from the lower border, add distances *X*, *Y*, and *H*. These distances should be found by actual measurements. In this problem *X* is 1 in., *Y* is 1½in., and *H* is 2½ in., and the sum of three is 5 in. From the total vertical space between the borders subtract 5 in. In this case the vertical space is 7 in. Thus, $7-5=2$, or as in Figure 2, *B* equals $\frac{W-(X+Y+H)}{2}$. This gives an answer of 1 in., which is the vertical distance of point *C* from the lower border.

The next step is to find how far from either border on the right and left of the paper point *C* is to be located. In this case we measure the distance between points *E* and *F*. This gives the total horizontal space that the object will take. Subtract this distance from the total horizontal distance between the borders. Example: *EF* is 4½ in. The distance between borders is 9½ in. Then 9½ in. — 4½ in. = 5 in. Divide this by two and the answer is 2½ in., the distances the corners of the object are from the borders. Now to this add distance *EC*, which in this case is 1¾ in. Thus, we find that point *C* is to be 4¼ in. from the left border. As shown in Figure 1, A + M is the desired distance which we have found. Thus, we have accurately located point *C* as the starting point of the object to be drawn.

AERONAUTICS

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(Continued from page 295 of the September, 1946, issue)

UNIT III

Aircraft Structures and Identification

Word list for this unit:

1. fuselage	26. asbestos
2. empennage	27. celluloid
3. fin	28. casein glue
4. rudder	29. soldering
5. stabilizer	30. brazing
6. elevator	31. acetylene welding
7. parasol wing	32. arc welding
8. fighter plane	33. clevis bolt and pin
9. transport plane	34. spar
10. supercargo	35. rib
11. jet propulsion	36. cantilever
12. longerons	37. monocoque
13. chines	38. fairings
14. keel	39. cowling
15. strut	40. oleo strut
16. alloy	41. spray strips
17. carbon steel	42. hydraulic
18. molybdenum	43. pneumatic
19. vanadium	44. panel
20. long staple cotton	45. bays
21. mercerizing	46. cell
22. foil	47. truss
23. bronze	48. shear stress
24. babbit	49. compression rib
25. monel metal	50. tension

I. Parts of a typical plane

A. Fuselage — the body of the plane. It serves as an attachment point for other parts of a plane.
   1. Power plant — engine and propeller. Cowling covers the engine.

B. Wings — the plane's lifting surfaces
   1. Ailerons — wing structure to help with the lateral control.

C. Landing gear or undercarriage — consists of wheels with an axle and bracing.
   1. Brakes are common especially on the larger planes.
   2. Shock absorbers absorb the jolt when the plane first touches the ground in landing.
   3. Tail skid or rear wheel.

D. Empennage — tail surfaces at the rear end of the fuselage.
   1. Fin — vertical stabilizer
   2. Rudder — movable portion of the vertical tail surfaces
   3. Stabilizer is a fixed horizontal surface at right angles to the vertical fin.
   4. Elevators are the movable portions of the stabilizer assembly with which the nose of the plane is raised and lowered while in flight.

II. Recognition of planes

A. Number of wings and position
   1. Monoplane
      a) High wing (Martin Mariner PBM–1)
      b) Low wing (Boeing B–29)
      c) Parasol wing (PBY–5 Catalina)
      d) Mid-wing (Brewster Buffalo F2A–3)
   2. Biplane
      a) Used mainly for training or carrier based planes (Curtiss Helldiver SBC–4 or Grumman Wildcat F3F–2)
   3. Triplane
      a) A French model only one known to have been used

B. Number of engines and position
   1. Single engine
   2. Two-engined
      a) P–38 Lockheed Lightning
      b) B–25 Douglas Mitchell
   3. Four-engined
      a) B–17 Boeing Flying Fortress
      b) B–29 Boeing Super Fortress

C. Shape of wings
   1. Straight (Stinson L–1A)
   2. Elliptical (Supermarine Spitfire)
   3. Balanced taper (Martin B–26)
   4. Sweepback (B–17)
   5. Trailing edge taper (A–20)
   6. Gull (Martin PBM–1)

D. Fuselage distinguishing points
   1. Unusual position of any parts
   2. Position of horizontal stabilizer
   3. Shape of the vertical fin and rudder

E. Flying boats
   1. Flying boats (PBY–5)
   2. Twin float type
   3. Single float seaplane (Vought-Sikorsky Kingfisher SB2U–3)

F. Autogiro — both propeller and rotating blades
   1. Kellet
   2. Pitcairn

G. Helicopter — has only rotating blades for all motion

H. Ornithopter — no known type perfected for flying

III. Types of planes

A. The types of planes in common use at present
   1. Military
      a) Fighter
      b) Bomber
      c) Transport
   2. Civilian
      a) Personnel transport
      b) Cargo transport
   3. Gliders
   4. Jet propelled

B. Anticipated types
   1. Jet propelled
   2. Supercargo planes

IV. Materials used for building planes

A. Wood — approximately seven species used
   1. Spruce is used in the manufacture of struts, wing beams, and in hull and float construction.
   2. Ash is used in longerons, float chines, keel members, tail skids, cabane struts, and bearing blocks.
   3. Fir is a satisfactory substitute for spruce.
   4. Mahogany is used for veneer coverings, rib webs, and in deck, bottom, and bulkhead planking of floats and hulls.
   5. Balsa is used in fairing strips and streamlining.
   6. Hickory is used in landing gear struts and wing panel bows.
   7. White pine is used for patterns and forms.
   8. Woods have remarkable strength for their weight. Spruce is 2.6 times as strong as steel for the same weight and length.
   9. Strength is affected by structure, kind, age, when felled, method of sawing, moisture content, defects, amounts of sapwood and heartwood.

B. Metals — the following metals are used extensively in aircraft structures.
   1. Steels
      a) Carbon steels (carbon, manganese, silicon, sulfur, and phosphorus)
         1) Low carbon steels (less than 0.25 per cent) are readily welded and incapable of being hardened except by case hardening.
         2) High carbon steels (0.50 per cent) have increased strength and hardness at a sacrifice of ductility and weldability.
   2. Alloy steels
      a) Nickel steels (3–5 per cent) have ability to resist shocks and repeated stresses. Should be used only after being heat treated — no good for welding or brazing. Use is limited to bolts, shackles, and small machined parts.
      b) Molybdenum (0.2–1.0 per cent) with chromium, nickel, both or alone, increase the temperature at which the steel can be hardened and facilitates welding. Practically all fuselages are made of this or riveted aluminum alloy.
      c) Vanadium (0.15–0.25 per cent) causes resistance to impact, vibration, and reversal of stress. Very fine grained.
      d) Tungsten
      e) Titanium
   3. Aluminum
      a) Pure aluminum is used for non-structural parts as cowlings, wheel pants, pigment for paints, enamels, and dopes.
      b) Alloys
         1) Wrought alloys are in the form of foil, sheets, bars, rods, wire, tubing, rivets, nuts, and screws. Usually 90 per cent aluminum with copper manganese, silicon, iron, or nickel. Dural, and Alclad are examples. These

alloys possess a high tensile strength of about 26,000 lb. per sq. in.

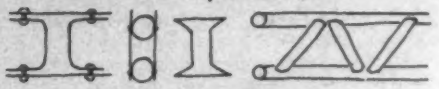
2) Casting alloys are those molded for such parts as cylinder heads and engine parts where a high tensile strength is not essential (19,000–30,000 lb. per sq. in.).

4. Copper and its alloys — used mainly for power-plant apurtenances for high electrical and heat conductive qualities which outweigh the weight disadvantage.
   a) Brasses — copper, zinc, alloy of more than 49 per cent copper. Used for tanks, radiators, heaters.
   b) Bronzes — copper — tin alloy plus zinc, lead, and phosphorus. Used for rods, wire, and bearings.
      1) Aluminum bronze
      2) Monel metal (copper and nickel) is used for carburetor needle valves, sleeves. Has a very high corrosive resistance.
      3) Babbitt (copper, tin, antimony) is used as a bearing metal or as a backing for a more corrosive resistance on duraluminum.
5. Fabrics
   a) Long staple Egyptian or Sea Island cotton fiber (1½ in. long staple, 4½ oz. per sq. yd., 60 strand, 2-ply yarn, 80 threads each direction and a strength of 80 lb. per in. in each direction). It has no sizing or starch.
   b) Mercerizing consists of steeping the yarns in an alkali (caustic soda or potash) at a cool temperature. It is then put under tension and rinsed. It shrinks about one fourth and produces a high luster. This both strengthens and softens the yarn and reduces moisture content.
   c) fabric tape — same material as airplane fabric
   d) Reinforcing tape is used for binding or reinforcing. Irish flax for linen thread, 9 strand unbleached, left-hand twist because machines tend to untwist a right-hand thread. It should be beeswaxed.
6. Miscellaneous materials
   a) Asbestos — nonconductor of heat and electricity
   b) Celluloid — made of nitrocellulose and camphor.
   c) Cork — heat insulation, floats, gaskets
   d) Felt — compressed wool or cotton and wool lining for tank straps to prevent chafing
   e) Glass — nonshatterable — used for goggles and instrument faces
   f) Leather — cushions, clothing, strainers
   g) Rubber — tires, gas tanks, water, fuel, and oil lines
   h) Glue — made of phenol formaldehyde to resist bacteria and fungus
   i) Plastics — bakelite, luscite, or bond for plywood

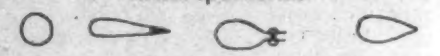
C. Joining processes
1. Wood joining — the contact surfaces should fit accurately. Splices to repair a broken part should be scarf joints on a 10–1 ratio.
   a) Casein glue (made from skimmed milk) is most commonly used.
   b) Nails, wood screws, and bolts are also used, but should be avoided. Use glue if possible.
2. Metal joining
   a) Soldering
   b) Brazing — joining steel parts by use of brass or brazing rod
   c) Welding — continuous joint of the same material as the original parts
      1) Acetylene welding is used on steel and aluminum joints
      2) Electric arc welding
      3) Resistance welding or spot welding is used to replace riveting.
   d) Riveting — rivets have several shapes; flathead, roundhead, button head, hollow, and blind.
   e) Seaming — not used on stressed skin construction but is used on tanks, boxes, or baggage compartments.
3. Fastening — parts that are intended to be taken apart during the life of the airplane are joined by fastening devices, the screw thread being the most common.
   a) Bolts and nuts — made of steel or aluminum alloy. They are identified by a star on the head of steel ones and by two grooves on aluminum alloy ones. After bolt and one washer are installed, a cotter pin should be used to safe-tie. The shank of the bolt should be installed in a downward position, a rearward position, or in toward the fuselage to prevent falling out if it becomes loosened.
      1) Clevis bolt (X on head) are used where there is considerable sheer loading.
      2) Drilled head aircraft bolts are inserted in a threaded hole. They are safe-tied by a wire passing through the drilled hole in the head of the bolt.
   b) Machine screws — used for nonstressed parts. Made of brass, aluminum alloy, or cadmium-plated steel. Safe-tied by elastic stop nuts, lock nuts, or peening the end of the shank.
   c) Sheet-metal screws — cadmium-plated steel and has a thread similar to a wood-screw thread. There are roundhead, flathead, binding, stove head, and oval head.
   d) Clevis pins — used for sheer loading. Used largely with a turnbuckle on the forked end. Safe-tied with a cotter pin.
   e) Taper pins — used to fasten the ends of tubing to a terminal.
      1) Plain taper pin
      2) Threaded taper pin
   f) Lacing and slide fasteners — eyelets or slides used on parts needed to open for cleaning or inspection.
   g) Safe-tying — all bolts, nuts, and fastening devices must be properly safe-tied. Most common means are cotter pins and safety wire.

V. Component parts of an airplane
A. The wings
1. Wing structure (wood or metal)
   a) Spars — to take care of bending loads
   b) Ribs — give the airfoil shape
      1) Former rib
      2) Compression rib
      3) False rib
      4) Leading and trailing edges

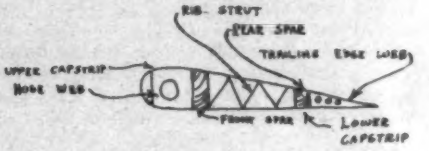
Wood spar forms



Metal spar forms



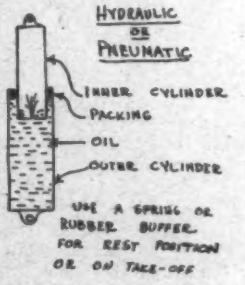
Aircraft tubing shapes



Airfoil shaped rib

      5) Corrosion and ventilation holes
   c) Covering
      1) Fabric covering
         (a) Blanket method
         (b) Envelope method — rib stitching
         (c) Doping — cellulose nitrate or cellulose acetate
   d) Struts — to take care of compression loads
      1) Interplane struts
      2) Drag struts
      3) Fuselage struts
      4) Longerons
      5) Empennage struts
      6) Engine-mounting struts
      7) Cabane struts
      8) Landing-gear struts
2. Wires and cables
   a) Hard-drawn wire of round section often called *aircraft wire* or piano wire
   b) Tie rods of circular, square, or streamlined cross section
   c) Nonflexible cable — aircraft strand
   d) Flexible cable — aircraft cable
   e) Extra-flexible cable
3. Fittings — a small part used to join structural members in such a way that the assembled parts are in position
4. Fairings — parts for producing low-drag shapes
5. Cowlings — sheet-metal covers around the engine to streamline it
6. Tanks — used for storage of fuel, engine oil, and the cooling liquid. They are built into the wings and have a drain.

B. Landing gear
1. Shock absorber
   a) Hydraulic and pneumatic
   b) Rubber disk



Hydraulic shock absorber

c) Spring type (coil or leaf)
2. Oleo gear
3. Wheels
a) Disk
b) Cast type
1) Brakes — operate independently
2) Tires
4. Skis

C. Floats and hulls
1. Single float
2. Twin float
3. Flying boat
4. Amphibian
5. Keels and keelsons
6. Chines and stringers
7. Float frames
a) Float or hull steps — used to break up suction on the bottom of the float
b) Spray strips

VI. Structures of (or units) of an airplane

A. Wings
1. Function and location of the wings
2. Terminology of the wings
a) Panel — part of the wing built as a unit
b) Cell — the complete assembly of wings and bracing members
c) Bays — a division of a cell including the structure between two sets of points of attachment of interplane bracing members
3. Types of wing panel construction
a) Two-spar type
b) Monospar type
c) Multispar type
d) Veneer panel
e) Monocoque
4. Wing cell types and arrangements
a) Full cantilever
b) Semicantilever

B. The fuselage
1. The function is to provide space for power plant, fuel, crew, equipment.
2. Types of fuselage construction
a) Truss — metal tube and veneer construction
1) Metal-tube, Pratt-truss fuselage
2) Metal-tube, Warren-truss fuselage
b) Semimonocoque
c) Monocoque
1) Reinforced shell — the skin is reinforced by a framework of structural members
2) Semimonocoque has the skin reinforced by longerons and vertical bulkheads, but has no diagonal web members
3) Monocoque has only vertical bulkheads formed of structural members for reinforcement.

C. The empennage
1. Terminology and functions — control or stabilizing surfaces at the rear of the plane
a) Horizontal surfaces are the elevator and stabilizer.
b) Vertical surfaces are the fin and rudder.
c) Control surfaces are the rudder and elevator.
d) Stabilizing surfaces are fin and stabilizer.
e) Fin — a fixed airfoil for directional stability.
f) Rudder — a hinged, movable airfoil used to control the yawing movement of the plane.
g) Elevator is a hinged, movable airfoil, used to control a pitching movement of the plane.
h) Stabilizer is a fixed airfoil for longitudinal stability.
2. Types of construction
a) Elevators are usually tubular-type construction or box-spar construction.
1) Should have a common spar for both panels.
b) Rudders are not of symmetrical design, used only to fit the plane used on. Tubular-type construction used most probably.
c) Stabilizers are of symmetrical design, have a tendency to show greater thickness for more strength and rigidity in construction which will permit a higher aspect ratio.
d) Fins are important aerodynamically because of the rudder post which supports the rudder and acts as a kingpin for all empennage bracing.

D. Landing gears
1. Landplane landing gear types
a) Split-axle type — axle assembly, shock absorbing strut assembly, and the rear strut assembly
2. Cantilever single strut landing gear — one shock absorbing unit and small auxiliary struts
3. Tricycle landing gear
4. Retractable landing gear

VII. Inspecting and maintenance

A. Maintenance functions are:
1. Inspection
2. Upkeep
3. Repair
4. Overhaul

B. Daily flight inspection record

THE TEACHER AND HIS USE OF FILMS

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Industrial Teacher Training School
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Many school administrators answer in the affirmative when asked whether or not they use films in their schools. Frequently, however, further questioning brings out the fact that the films serve as a diversion or interlude in the regular routine teaching procedures, and serve as a form of entertainment rather than an effective teaching aid.

The use of films in all cases should be integrated with the subject matter and objectives of the courses of study. Therefore, it is necessary to make an analysis of the material to be taught and the available films on the subject under consideration. After this phase of the task is completed the further development of a program of visual aids depends on the alertness and initiative of the individual teacher. Despite any favorable disposition of the school administrator to the use of these teaching aids, the success or failure of such a program rests with the methods utilized by the various shop and classroom teachers. The number of films used, in many cases, is in direct proportion to the ease with which the average teacher can secure them for use.

In many schools a special room has been reserved and generously equipped for all projection purposes. A regular faculty member has been placed in charge of room reservations and film distribution. Such a room is justified in three ways:

1. The showing of motion pictures requires a special setting. The room must be dark, and acoustically treated.

2. The complicated sound motion picture machine cannot be moved easily and furthermore should be operated by persons trained for the purpose.

3. It would be inadvisable financially to equip every classroom for the showing of motion pictures.

These are three very good reasons for the use of a special projection room as far as motion pictures are concerned. Although motion pictures are playing an important part in vocational education today, the strip film promises to play the major role in the day-to-day teaching of trade, technical, and industrial-arts work. It is, therefore, necessary to consider the use of strip film from the standpoint of the average teacher. It is reasonable to assume that the average teacher is acquainted with the available films in his field of work and is willing to use them for instructional purposes. Unfortunately, he encounters certain difficulties in the use of the desirable films and consequently assumes a passive position resulting in nonuse of these valuable teaching aids. Let us analyze the situation in order that the inhibiting factors may be discovered and suggestions be made to eliminate them.

In the first place the use of film should be correlated with the period of greatest need for the particular instruction. The teacher must estimate the time when his class or group will be ready for the film showing. According to his best judgment he decides that Tuesday

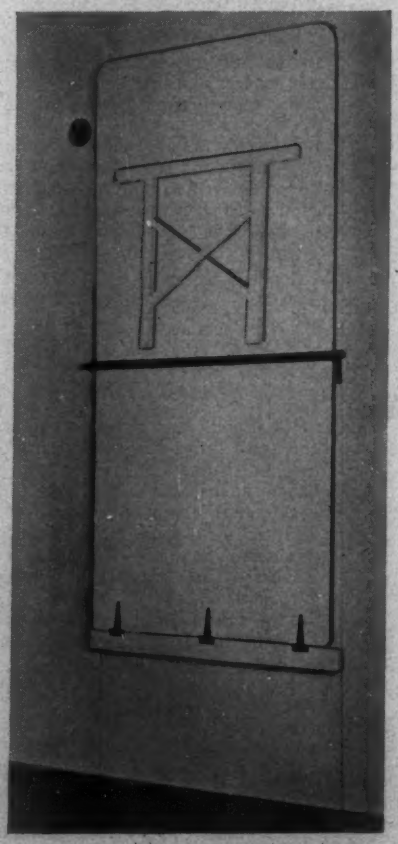

Fig. 1. Folding table

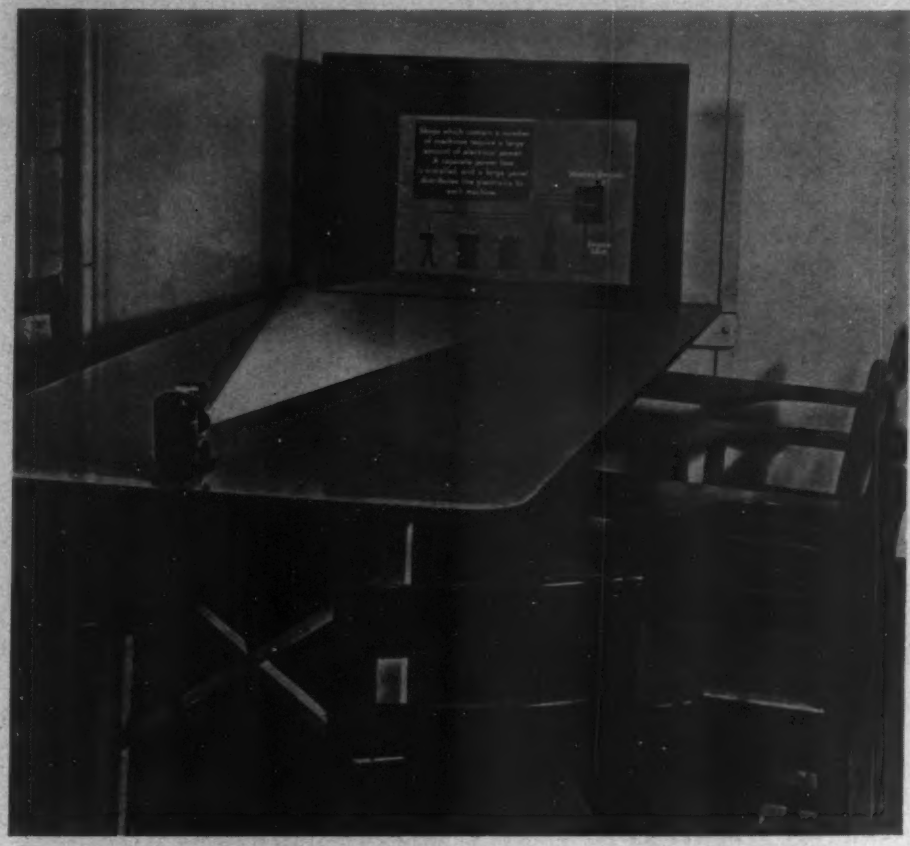

Fig. 2. Folding table in use

morning appears to be the opportune time and he consequently submits his request for the use of the facilities of the special projection room. He is advised that no time is available between Monday morning and Thursday afternoon. Reluctantly he accepts Thursday as the lesser of two evils with the hope that he may be able to retard his instruction or rearrange his instructional sequence to avail himself of the films at the designated time. Immediately his enthusiasm is leavened. In the interim he finds that he cannot conscientiously change his instructional program and consequently the film will be shown Thursday although it should have been presented on Tuesday when the time of greatest need existed. This kind of experience has tended to dilute the interest and enthusiasm of teachers in the use of films as teaching aids. This situation will repeat itself in a large school with many requests from teachers to show the numerous interesting films available on practically all school subjects.

Another situation may be described that also tends to discourage the use of film in a special projection room by the average shop and classroom teacher. This difficulty involves the condition of the projection apparatus. In this case it has been possible to reserve the room on the day and hour desirable but upon arrival of the teacher with his class, it is discovered that the projector has been broken, or a part is missing or otherwise not in working order. Consequently, there is considerable delay in starting and in the meantime discipline problems naturally develop. The sum of these difficulties means discouragement and antagonism toward film use.

The question immediately is asked — what is the solution to these problems? There may be no panacea to all these difficulties but several suggestions may be offered.

1. Confine the central projection room to the showing and storage of motion pictures *only*.

2. In lieu of the centralization of all film storage, permit each instructor to retain in his own department, the strip films that pertain to his particular subject. The instructor in this case is responsible for the films and he has them available for immediate use when the teaching situation requires it.

3. In place of one high priced strip film projector for the projection room, purchase inexpensive projectors that will permit every instructor to have his own. It may be convenient to assign two instructors in adjacent departments to each projector. This arrangement will reduce to a minimum the difficulty of lost or broken parts as well as definitely place the responsibility for the equipment. There are on the market satisfactory strip film projectors for less than $30 that are adequate for groups of 30 or less. The time is rapidly approaching when a strip film projector will be a part of almost every teacher's instructional equipment.

4. Substitute an ordinary white window shade in the classroom or shop for the more expensive screen of the projection room.

These few suggestions will tend to eliminate the inhibiting factors which prevent the wider use of films for instructional purposes.

However, there is a need for additional facilities in the school shop for showing films. This equipment should be convenient and as simple as possible. These desirable features are embodied in the apparatus shown in Figure 1. The board or table may be compared with the wall ironing board in the modern home. It is hinged to the wall and may be dropped to position for use when needed. It is 48 by 96 in., which is large enough to accommodate eight students, if taking notes is desirable.

There may be many times when the entire class is not concerned with a specific film in which case the class or shop room should not be dark in order that other students may continue their work without interruption. To overcome the objection of interference of light and pulling down of shades, a shadow box made of pressboard has been placed at the end of the table against the wall. The sides and top of this shadow box are painted black in order to increase the visibility of the picture and reduce the interference of daylight. It will allow the showing of a picture approximately 16 by 25 in. See Figure 2. The shadow box (40 by 24 by 10 in.) is placed in a fixed position but the top and sides are hinged in order that it may be collapsed and laid flat against the wall behind the board when it is not in use.

This is an inexpensive arrangement, easily made in the school shop, convenient for use, requires limited space, and within the control of the individual teacher. It is to be recommended for individual shop use wherever strip film is used.

ORNAMENTAL TIN CRAFT

CHRIS H. GRONEMAN

Industrial Education Department
A. & M. College of Texas
College Station, Tex.

(Continued from page 22A of the October, 1946, issue)

Hurricane Lamp

The gleam of the light within this hurricane lamp presents an unusual scene of tin plate reflecting against tin plate through the numerous small windows. This is undoubtedly the most difficult of the entire series, but it has

Fig. 1. Hurricane lamp

been successfully made by students and craftsmen.

Considerable patience and time are required in the making and fitting of the 12 little windows in metal holders. Section A–A on the drawing shows how these sections are fastened to each other. The metalworker must be expert with the soldering copper to make neat joints. A prick punch, cold chisel, and drill will do much to ornament the backpiece to give the slightly Mexican effect. Many details, such as fitting the door catch and hinges, depend upon the ingenuity of the craftsman, and because of this, only the most interested and talented metal craftsmen should attempt this lamp. The interior shelf used as a lamp support may be equipped to mount an electric socket or candle.

The tin plate can be preserved with a coating of clear metal lacquer after the entire project has been completed.

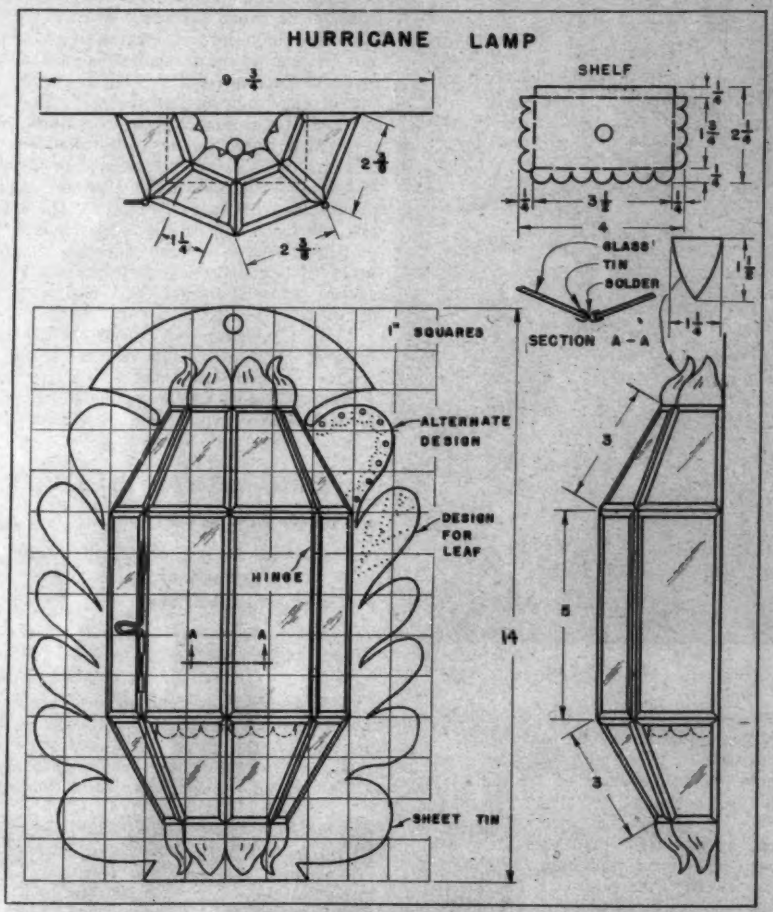

Fig. 2. Hurricane lamp details

BILL OF MATERIALS

No. of pieces	*Item*	*Size*
1	Sheet tin for back	10 x 14
8	Sheet tin for top and bottom ornaments	1¼ x 1½
48	Sheet tin strips to enclose glass windows	Varied
1	Sheet tin shelf	2¼ x 4
1	Electric socket and necessary cord and plug, or candle-holder	
12	Single strength glass	Varied
	Solder, flux, steel wool	

Tools:

Alcohol burner, brush, cold chisel, emery cloth, file, hammer, hand drill and bit, heating device, jeweler's saw frame and blade, lead or wood block, pencil, rule, scriber, soldering copper, yellow tempera water color paint, and tin snips.

Procedure:

1. Use design as shown in the drawing, or develop an original design.
2. Cut out back with jeweler's saw frame and blade or with jig saw. The jig saw can be used to advantage by fastening the metal sheet between two thin pieces of plywood and then cutting out the design.
3. Apply coat of yellow tempera water paint to portions of backpiece to be decorated for design transfer.
4. Lay design sheet and carbon paper over painted portion and trace design.
5. Chase, punch, or drill design on pedals as traced.
6. Cut out all remaining sheet tin pieces with tin snips.
7. Cut glass to sizes found by folding cardboard or heavy paper to conform to drawing. It is advisable to make this dummy before cutting glass or fitting metal strips to hold glass.
8. Fit metal strips to glass pieces to form frames.
9. Solder individual frames over glasses.
10. Form and mount shelf to back by soldering.
11. Mount framed glasses by soldering joints. See Section A–A in drawing.
12. Attach top and bottom ornaments with solder.
13. Clean glasses and polish metal parts with steel wool.
14. Apply coat of clear metal lacquer to all metal parts.

CORRECTION

Unfortunately, an error crept into Hartingh W. Babcock's article, "Simplified Formula for Tailstock Setover for Taper Turning," on page 306 of the September issue. In the paragraph following the sample calculation in the center of the page the fraction should be 3/16, not 5/32.

DESK PICTURE FRAME

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Athens, Ohio

Many projects made in the machine shop may be used only as a tool or as an accessory to a machine. The accompanying illustration shows a machine-shop product which makes an attractive addition to any desk and involves many basic lathe operations. To make this frame, the student is required to do straight turning, facing, boring, chuck turning, and double-feed turning.

Desk picture frame

The dimensions may be varied to suit the individual taste or to fit the photographs. The design of the base may be turned to a different shape, or a semicircular type of base may be used which would involve the use of the milling machine or shaper. The material used in this frame is brass, but aluminum makes an equally attractive project. If the correct size stock is not available it may be cast in the foundry.

The frames are held to the upright by a small bolt which is cut to the correct length. Holes are drilled and tapped in the frames and entirely through the post. The post is threaded into the base.

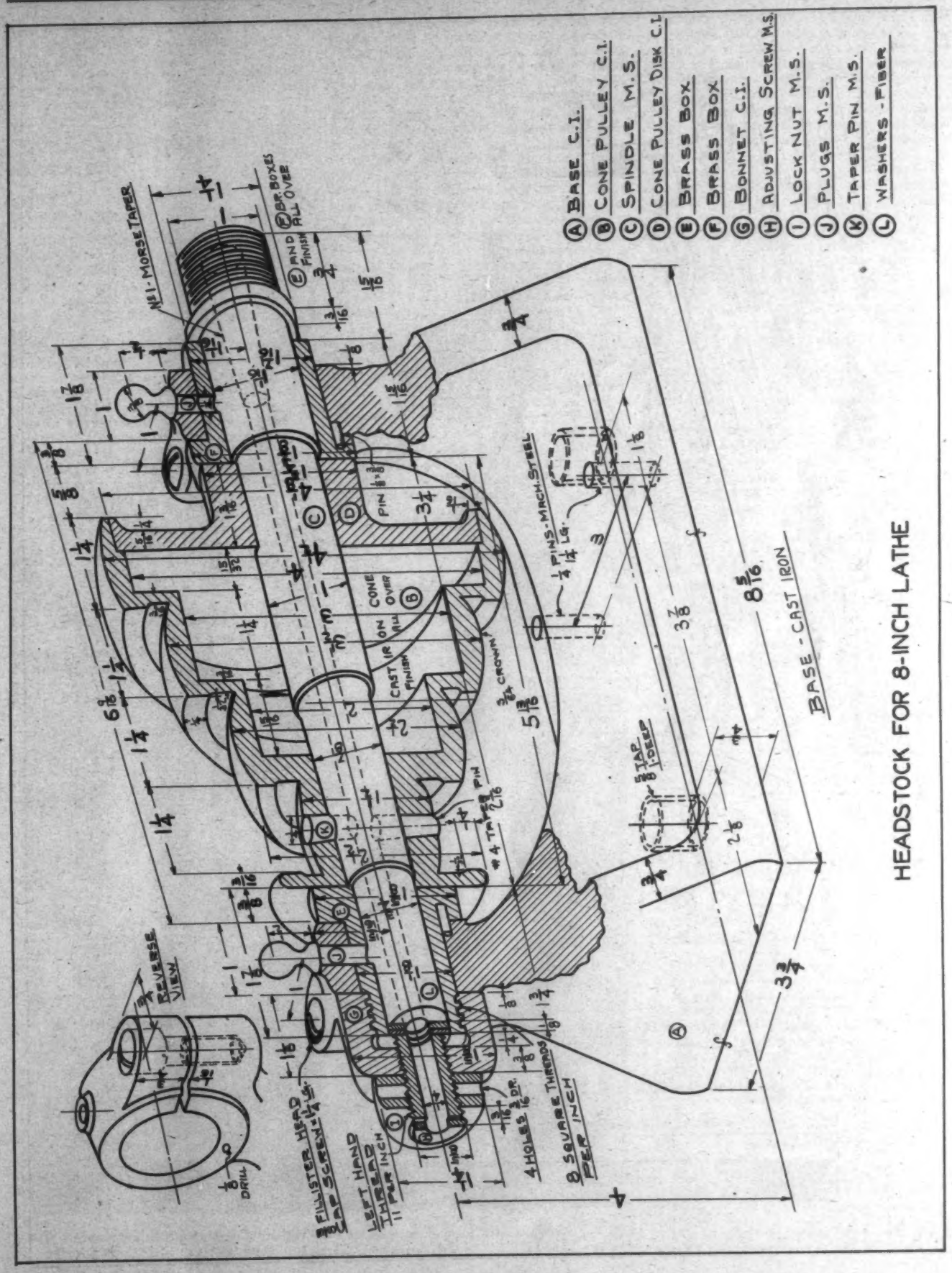
LATHE HEAD AND TAILSTOCKS AS DRAWING PROBLEMS

ROBERT J. WATSON
South Hills High School
Pittsburgh, Pa.

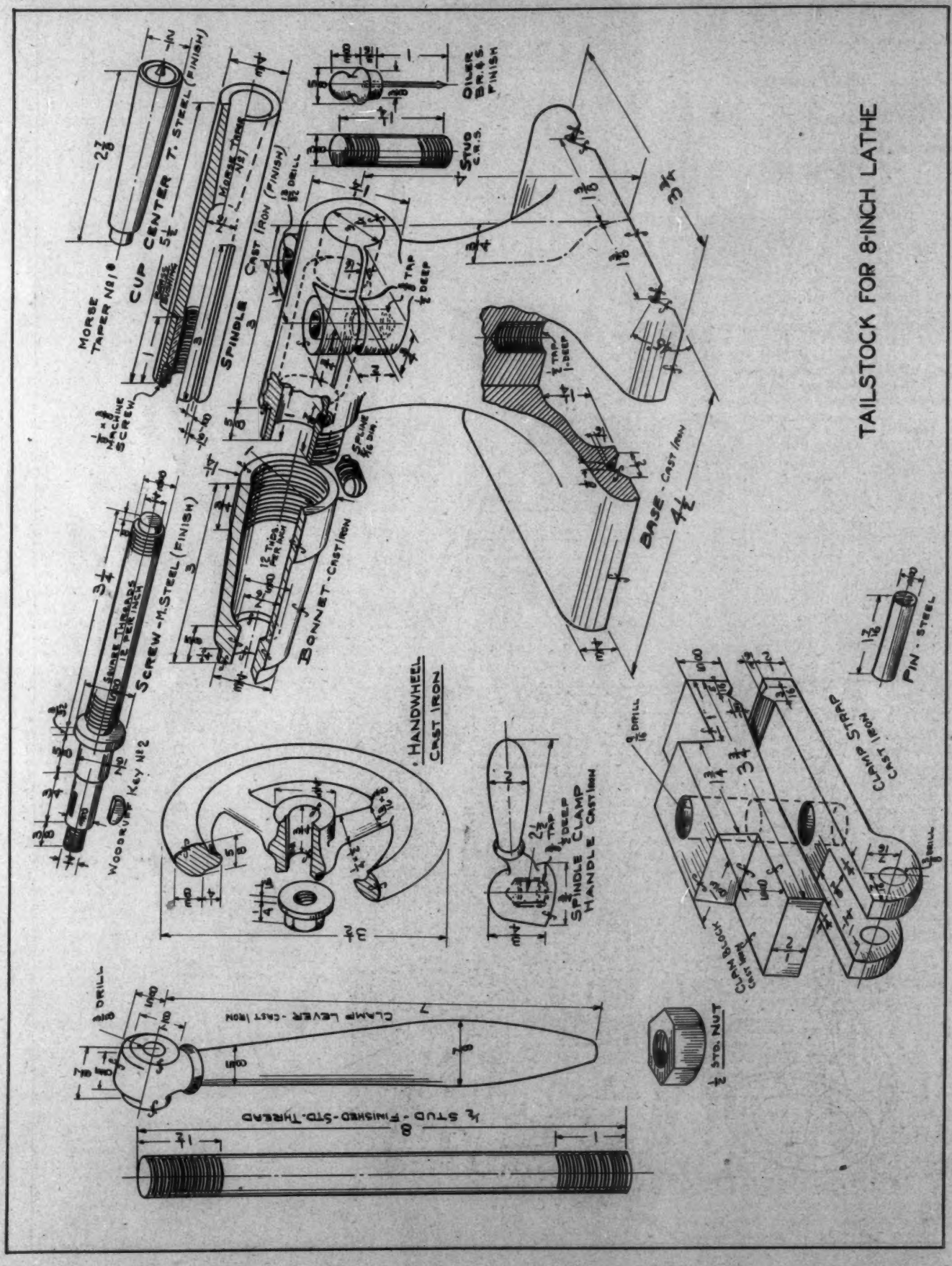
The lathe headstock and tailstock are offered as problems in machine drawing in whichever course they are best fitted for. The names of all the parts are given for the headstock and the problem, of course, is to take the various parts and make working or detail drawings of them.

The assembly drawing is then easily made. The tailstock drawing gives an isometric

(Continued on page 421. See drawings on pages 419 and 420)



Headstock for 8-in. lathe by Robert J. Watson



Tailstock for 8-in. lathe by Robert J. Watson

view of each piece and a working drawing of each part is expected from the student.

The assembly view of the tailstock is more difficult to make than that of the headstock.

The problem feature in these drawings is the important factor to the student.

FOREMAN'S CLUB

NAIDENE GOY

Township High School

Hinsdale, Ill.

When a visitor enters the industrial-arts department of the Hinsdale Township High School, Hinsdale, Ill., he is almost certain that he is no longer in school. Were it not for the age of the workmen at their tasks, the visitor would come to the conclusion that he is in a small factory or machine shop. The illusion of a real factory seems more pronounced when the visitor looks around for an instructor and finds boys directing the work of other boys who attentively follow the suggestions made by their fellows.

After some inquiry, the onlooker learns that there is a unique organization at work in the shop, an organization which is made up entirely of students who are demonstrating the finest type of leadership. This organization is known as the Foreman's Club. These unheralded members of the industrial-arts classes are sophomore, junior, and senior boys who give up a study hall period each day in order to learn and to practice valuable leadership qualities as shop superintendents, foremen, and tool boys, and who, acting independently, are able to conduct a class even if the teacher is absent. Each Tuesday and Thursday, during the activity period, the members of the club meet in a lecture and discussion period, and every day each member of the club is able to put into practice what he learns in a shop class.

The Foreman's Club exemplifies an excellent spirit of co-operation and student leadership. The boys are responsible and relieve the regular instructor, H. F. McKee, of many routine duties. They supervise the class entirely by themselves in case of the instructor's absence.

While the procedure of the club is much like that of any other club, the seriousness with which the members carry on the discussions of industrial problems would lead one to believe that the very wheels of industry would stop if any member failed to fulfill his appointed task. The president calls the meeting to order, after which the secretary calls roll and reads the minutes of the previous meeting. Then the discussion of shop problems ensues.

Among the problems discussed are: Why do we have a foreman's club? How can we improve the foreman's rating sheet? Is the name of our club adequate to cover the kind of work we do? Would the term *supervisor's organization* be a better name? How can we stop the slow-up of certain students? What is a shop slacker? What special jobs can we find for the boys who finish their jobs ahead of schedule? Is our maintenance work adequate? Why don't we give the boys more thread-cutting jobs to do? Have you observed any improper treatment of metal dowels today? Are your boys observing the rules regarding the lathes? Shouldn't we do something about cleaning up the grinders and power saws? Now that wartime restrictions are lifted, ought we to start visiting nearby factories again? Shouldn't we invite shop foremen to talk to us? And so the questions continue until the time of the activity period has been exhausted and the time has been extended again and again. Members of the foreman's club don't quit their work with the ringing of the bells.

The industrial-arts department offers two years of training to the boy. The beginning course has been organized for freshmen boys whether they plan to attend college or not. The boy is given an opportunity for orientation and exploration in drawing, metalwork, and woodwork by a twelve-week course in each. Most of the boys who complete the course choose a hobby in one of these fields. At all events, they learn to make household repairs. The advanced industrial-arts course consists of one semester each of metalwork and woodwork. The boy is permitted to spend additional time in the fields of wood turning, cabinetmaking, machine shop, welding, foundry, and forging. This course is primarily for the engineering and noncollege student. Advanced work is offered in materials and with machines so vital to the world of today. The engineering student may here receive the mechanical background that colleges expect their technical students to have, and the noncollege student has an opportunity to make an intelligent choice of fields to be followed as a vocation.

The industrial-arts department is organized into nine departments, the machine shop, gas welding center, woodworking, toolroom, foundry, heat-treating area, electric-welding area, glue area, and washroom. The foremen and superintendents are constantly on the alert to see that safety rules are carried out. No tools may be taken from the toolroom without checks. Cleanliness, care, and order are strictly enforced by these future industrial leaders.

Now in its third year, the Foreman's Club has contributed two outstanding benefits to its members. It has helped the industrial-arts boys to learn to get along well with others and it has helped them to direct the work of others. At the present time, Mr. McKee is endeavoring to have the work that these boys do recognized as a normal credit subject by the accrediting department of Illinois. Possibly one-half credit will be given to foremen and one-fourth credit to tool boys. But whether credit is given or not, the visitor will find these future industrialists busy at their tasks, building good will among the students, and learning valuable leadership qualities.

Members of the Foreman's Club, Township High School, Hinsdale, Ill. H. F. McKee, industrial-arts instructor

GALVANIZED IRON TOOLBOX

HARRY W. KROLL

Senior High School

Rockford, Ill.

General Directions:

1. Study the drawing of the body carefully.
2. Make a trial sample of a joint or construction which is new, in order that it may be more clearly understood when you work it out on the project.
3. Go over the drawing and note the number of pieces required and the dimensions of each piece.
4. Cut out all the material for the project after completing step No. 3.
5. Use the bottom seam block, shown in Figure 2, in making the double-seamed joint on the bottom.
6. At *A* in Figure 2 is shown how to use the turning machine in making the swage or bead at the top of body.

Material

No. 28 galvanized iron, No. 10 and No. 8 wire; 2 escutcheon pins or 1½ lb. rivets.

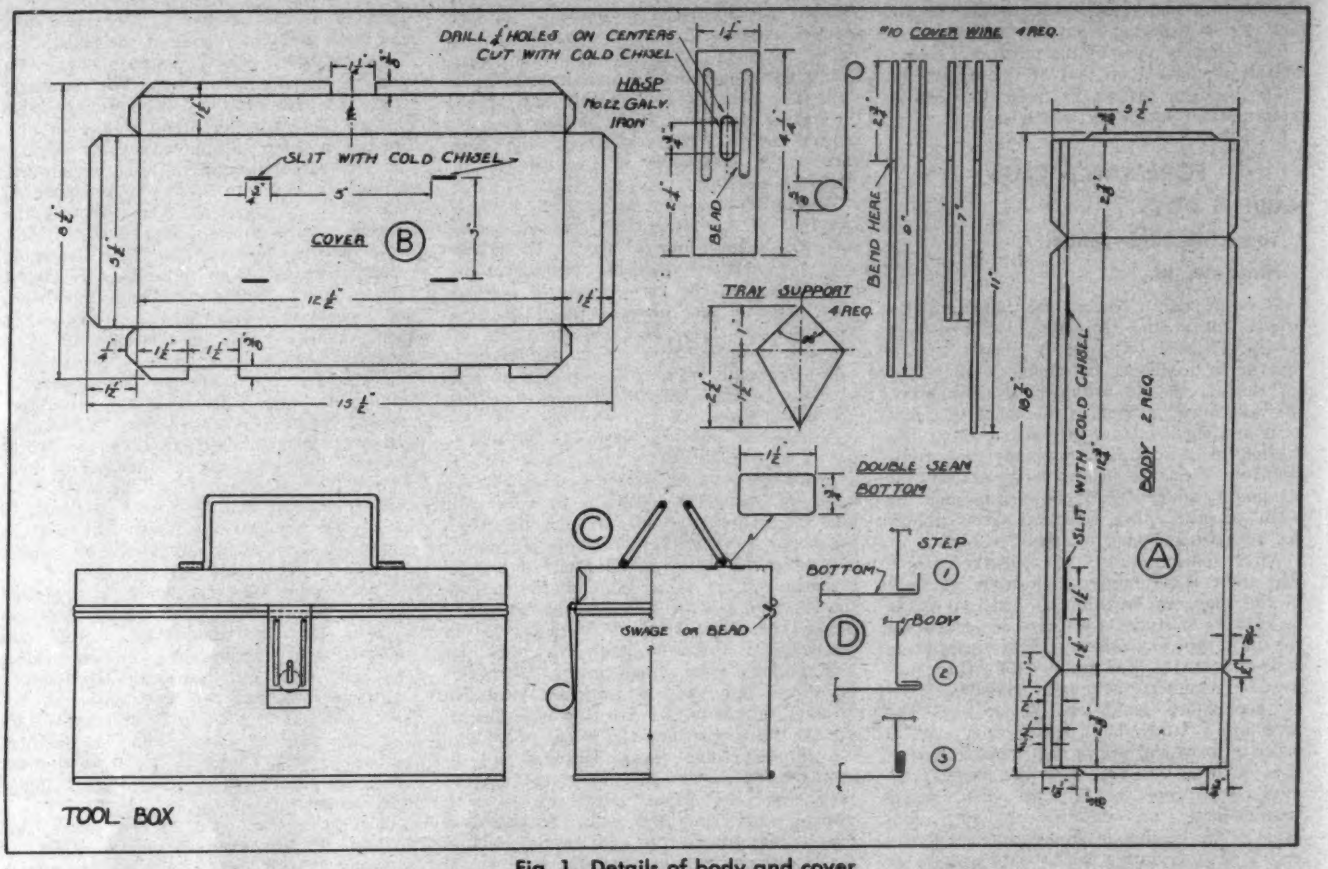


Fig. 1. Details of body and cover

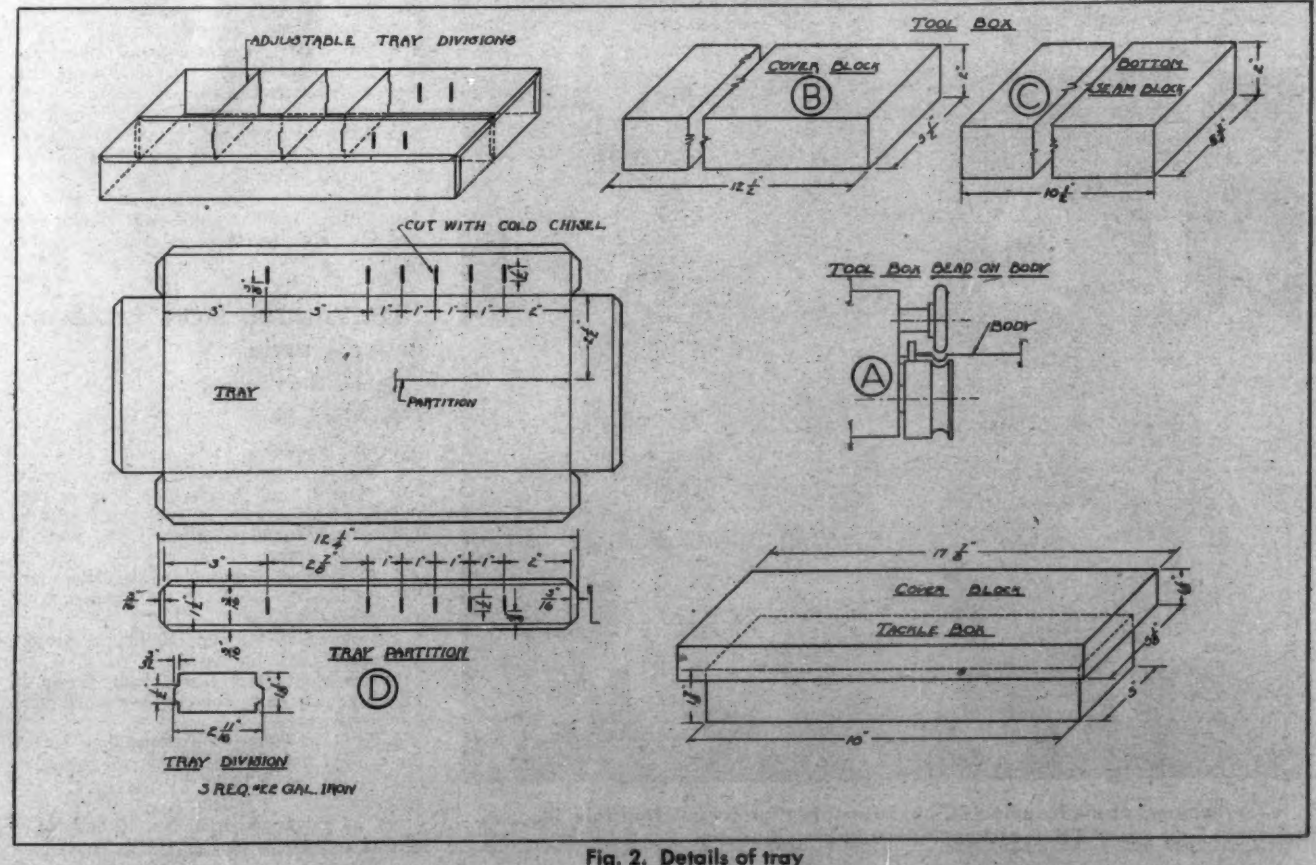


Fig. 2. Details of tray

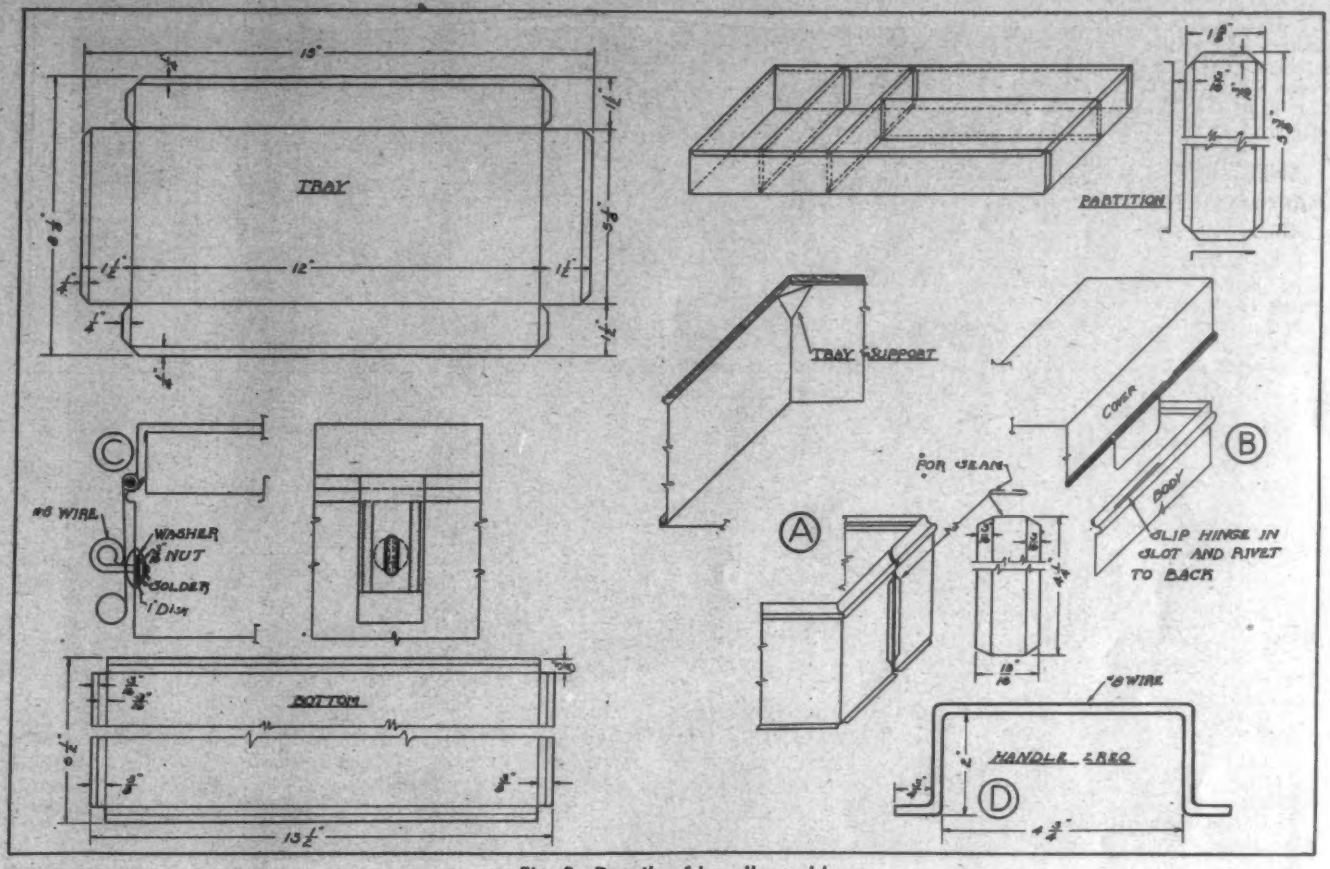


Fig. 3. Details of handle and hasp

Body

1. Cut the openings for the hinge pieces with a cold chisel. The metal is merely slit along the line indicated. See *A* in Figure 1.
2. Fold over ¼-in. single hem on the top edge as shown.
3. Fold the 3/16-in. allowance at each end over to the body onto the side opposite the fold on the top edge.
4. Fold the 3/16-in. allowance at the bottom edge out at right angles to the body in the same direction as the fold in step No. 3.
5. Form the bead or swage just below the ¼-in. fold as shown at *A* in Figure 2.
6. Fold the body to the correct shape over a stake.
7. Fold the material for the clip-lock seam and slip in place as shown at *A* in Figure 3. Solder the joint on the inside of the box.
8. Complete the upper corners of the body to form a good miter joint, peening them slightly to round them a little. This will allow the cover to set down on the top edge more evenly.

Cover

1. Cut the slots in the cover for the handle clips. See *B* in Figure 1.
2. Fold the edges of cover to fit No. 10 wire.
3. Bend the sides of the cover down over the folding block shown at *B* in Figure 2, and turn the laps at the corners.
4. Bend the 4 pieces of wire 2¾ in. from one end, to a right angle in the vise. Place the longest piece over the hasp opening and the other pieces accordingly.
5. Complete the work on the wiring machine. Solder the corner laps in place.
6. Make the hinge pieces 1½ in. long and place on cover as shown at *B* in Figure 3. Center punch, drill, and cut out the material in the hasp.
7. Make the bead on the hasp where indicated and form to shape as shown at *C* in Figure 3.
8. Slip wound wire in cover and tighten.

Handle

1. Make the two handles of No. 8 wire. Be certain of the dimensions when bending in the vise. See *D* in Figure 3.
2. Bend the handle clasps around the wire and press tightly with pliers.
3. Slip clasps through opening and bend as shown at *C* in Figure 1. Solder tightly to cover.

Bottom

1. Fold 3/16 in. up at right angles on all edges of bottom.
2. Slip the body into bottom as shown at *D*, Figure 1, Step 1.
3. Place the bottom seam block, *C*, Figure 2, in place, and set down the seam by hand and then complete with the setting-down machine, as shown in Step 2 in Figure 1.
4. Move the block where the double seam joint is to be completed. The use of the block will assure a straight tight joint. Be certain to dress the seam. Solder on the inside of the body.

Assembly

1. Put the cover in place with hinge pieces through the opening in body. Adjust the cover and upper edge of body for a good joint.
2. Solder the hinges in place temporarily on the outside of box.
3. Drill ⅛-in. hole in center of each hinge piece through back of body.
4. Cut off No. 10 escutcheon pin to approximate length for upsetting as a rivet and complete work of riveting on the hinges.
5. Mark the location on front of body for the center of the wire catch.
6. Drill a 3/16-in. hole, and form the No. 8-wire catch. Thread the end of wire for the 3/16-in nut. See *C* in Figure 3.
7. Punch two 1-in. disks with a hollow punch. Punch 3/16-in. holes in the center of each, but leave disks in convex shape as shown at *C* in Figure 3.
8. Slip one disk onto the catch and solder on the inside of disk to hold it securely. Now slip catch through the body, slip on a small washer, turn on the nut and solder it securely to the catch. Place the last disk over the nut and solder around the wire coming through the center of disk. The two disks should turn with the knob.
9. Cut off surplus wire and file end smooth. By turning this wire catch down, the hasp is held in place. Turning it up and slipping catch through hasp permits opening of box.

Tray

1. Fold the 3/16-in. hem on all edges. See Figure 3.
2. Bend up the sides and fold the laps at the corners and solder.
3. Solder the tray supports in place. Put them high enough so tray will reach almost the entire depth of cover as shown at *C* in Figure 3.
4. The arrangement of partitions may be made according to choice.
5. Solder all joints on the inside of the toolbox.
6. Remove any sharp corners with file and clean entire project.

7. If a tray with adjustable divisions is desired, lay out the material as shown at *D* in Figure 2.

Finish

1. Paint the box and tray a suitable color of green and hang away to dry.

SHEET-METAL LETTER HOLDER

MARTIN PETERSON
Cincinnati, Ohio

1. Make a sketch of the end view of the letter holder (or card holder). See *A* in Figure 1.
2. Put in the number of inches in width at the bottom; also the height at the front and at the back, as shown.

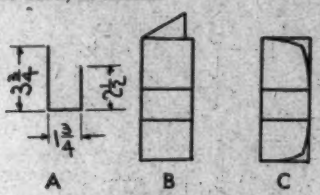
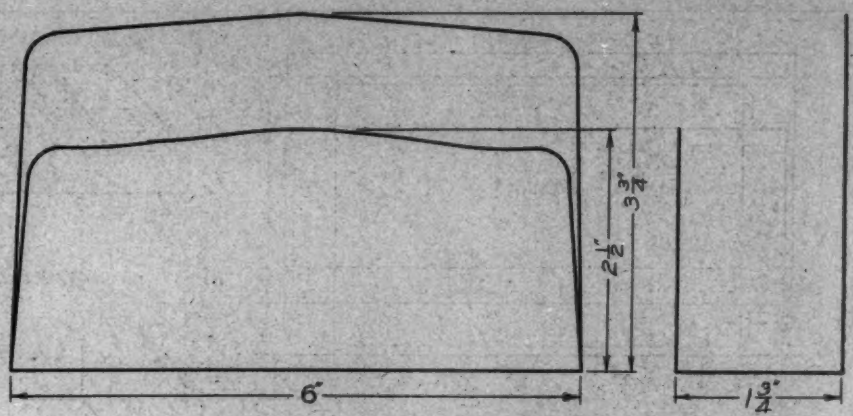


Fig. 1

3. Indicate how long you wish to have the holder.
4. Find the size of the metal you need — how wide and how long. Cut the metal to this size.
5. Cut a piece of paper the size of the metal.
6. Fold it to the shape of the letter holder. Be certain to crease the paper firmly. See *B* in Figure 1.
7. Unfold the pattern and make a crease down the center of the pattern.



Details of card and letter holder

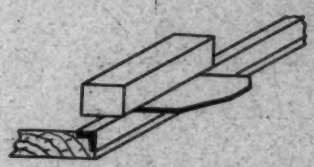


Fig. 2

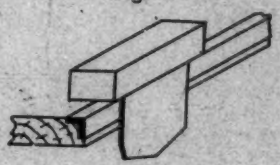
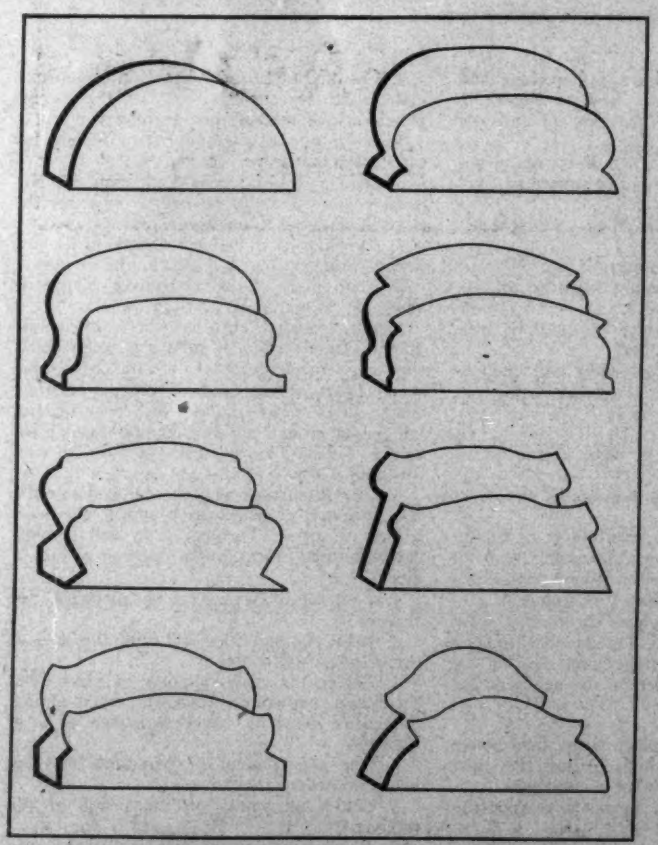


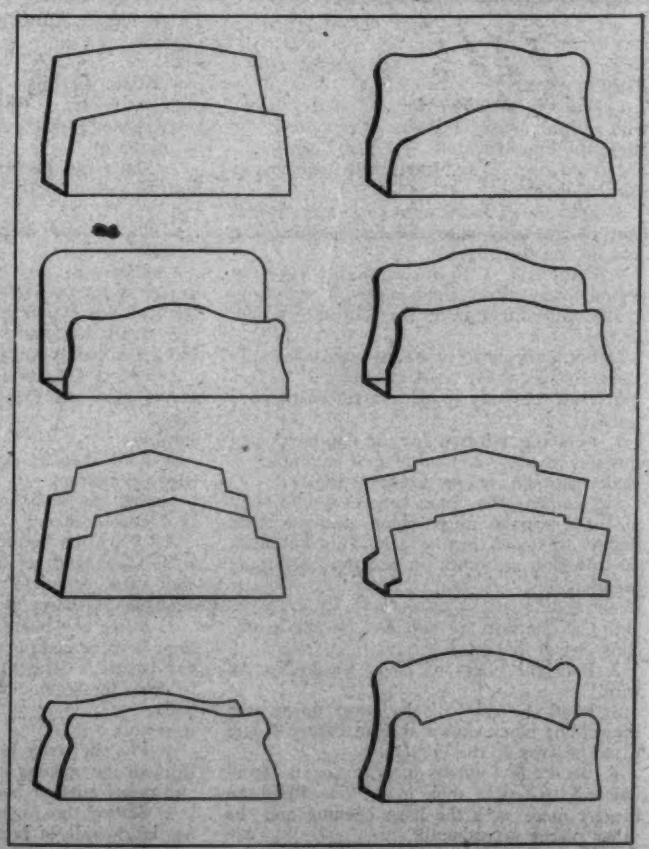
Fig. 3

8. Draw the design you wish for both the back and front. See *C* in Figure 1.
9. Show the design to your teacher.
10. Cut along the lines of the design.
11. Fold the pattern again into shape of the letter holder. Do you wish to have it look like this?
12. Trace the pattern on the metal.
13. Cut along the lines.
14. Trim all rough edges.
15. Polish the metal with steel wool.
16. Draw lines where the bends are to be made.
17. Place the metal on the bench, as shown, with a heavy piece of iron directly over the line where the bend is to be made, as shown

(Continued on page 18A)



Suggestive designs for letter holders



Suggestive designs for letter holders

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Long experience with class after class has proved to Industrial Arts Instructors that students take greater interest in their work, progress faster and become better craftsmen when their workshop tasks are performed with high quality tools.

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Your students will find the Disston Saw, Tool and File Manual helpful to them in their school work. It tells how to choose, use and care for tools. Their local hardware retailer will be glad to supply copies free.

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(Continued from page 424)

in Figure 2. The edge of the iron should be directly over the edge of the bench.

18. Press your hand on the iron and make the bend on the letter holder as far as possible with the other hand. See Figure 3.

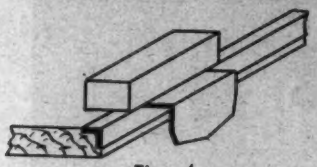

Fig. 4

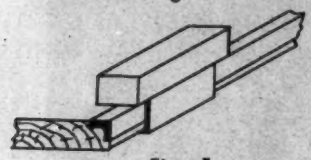

Fig. 5

19. Tap with a mallet to make the fold even.

20. Make a fold along the other line of the letter holder in the same way. See Figures 4 and 5.

21. Remove the letter holder and test with a try square.

22. Polish the holder again.

23. Apply the necessary finish.

President Truman Signing George-Barden Vocational Education Act. Left to right: Charles W. Sylvester; Mrs. Sylvester; Sen. Olin D. Johnston (S.C.); Sen. Walter F. George (Ga.); M. D. Mobley; Mrs. Mobley; C. L. Greiber; Cong. Graham A. Barden (N. C.); Mrs. Dennis; Sen. Lister Hill (Ala.); L. H. Dennis; Ira W. Kibby. Also present, U. S. Commissioner of Education John W. Studebaker and former Assistant Commissioner J. C. Wright. (Harris & Ewing Photo)

THE NEW GEORGE-BARDEN VOCATIONAL EDUCATION ACT

L. H. DENNIS

Executive Secretary

American Vocational Association

The George-Barden bill passed both Houses of Congress by almost a unanimous vote. The story of the passage of this vocational bill is, however, not as simple as that. There were many factors involved and some difficult differences of opinions to adjust. To a casual observer, at times the situation may have looked hopeless for the vocational bill.

Numerous changes were made in the two bills submitted in the Senate and in the House of Representatives. Action on the Senate bill, S.619, came first. The Senate revised the form of its bill so that the wording was almost identical with the language of the House bill, H.R. 4384, with the exception of some changes in appropriations. The bill passed the Senate without opposition.

The House Committee on Education promptly considered the Senate bill when it was referred to the House committee. The bill was reported out with a unanimous recommendation that it be passed with a few changes as reported. The House of Representatives took rather prompt action and passed the bill on Friday, July 26, 1946. There was only one negative vote. The following day the Senate promptly concurred in the form of the bill as reported out by the House Committee on Education.

Senator George and the other sponsors of the bill in the Senate, Senators Lister Hill of Alabama, George Aiken of Vermont, Elbert D. Thomas of Utah, Robert M. La Follette, Jr., of Wisconsin, Allen J. Ellender of Louisiana, deserve much credit for the successful outcome of this bill in the Senate. Congressman Graham A. Barden of North Carolina, the chairman of the House Committee on Education, and the author of the House bill, did a masterful job in piloting the vocational bill through many conferences, discussions, and disputes. He deserves the commendation of our entire vocational group.

President Truman signed the George-Barden measure at noon on Thursday, August 1, 1946. Several sponsors of the bill witnessed the signing. It was also witnessed by the four officers of the American Vocational Association, President C. L. Greiber, Wisconsin; former President M. D. Mobley, Georgia; Treasurer Charles W. Sylvester, Maryland; and Executive Secretary L. H. Dennis, Washington, D. C. Others present were A.V.A. Vice-President Ira W. Kibby, California; U. S. Commisioner of Education Dr. John W. Studebaker, Washington, D. C.; and former assistant U. S. Commissioner for Vocational Education Dr. John C. Wright, Washington, D. C. Assistant U. S. Commissioner for Vocational Education Dr. R. W. Gregory was invited to be present but was out of town.

Matching Provisions

100 per cent matching beginning immediately

Appropriations	*George-Deen Act*	*George-Barden Act*
Agricultural education	$4,000,000	$10,000,000
Industrial education	4,000,000	8,000,000
Home-economics education	4,000,000	8,000,000
Distributive education	1,200,000	2,500,000
Federal administration	350,000	350,000
Minimum Appropriations	*George-Deen Act*	*George-Barden Act*
Agricultural education	$20,000	$40,000
Industrial education	20,000	40,000
Home-economics education	20,000	40,000
Distributive education	10,000	15,000

New Authorizations or Requirements

Maintenance of administration, supervision, and teacher training;

Salaries and necessary travel expenses;

Vocational counselors and supervisors of vocational guidance;

Research in administration of vocational education and vocational guidance;

Training and work experience training programs for out-of-school youth;

Training programs for apprentices;

Purchase or rental of equipment and supplies for vocational instruction — not more than 10 per cent after June 30, 1951, for equipment;

Vocational education requirement in appointing new state directors;

Less than nine months per year and less than thirty hours per week permitted and no 50 per cent time requirement for shopwork for persons over 18 years of age who have left full-time schools.

Supplemental Appropriations Will Be Needed

Congress has already appropriated the money authorized under the George-Deen Act and the bill has been signed by the President. Supplemental appropriations will be needed from Congress in order to make effective the increase in appropriations authorized by the George-Barden Act. This matter and legal interpretations relative to the regulations governing the money already appropriated under the old George-Deen Act are being cared for by the vocational division of the U. S. Office of Education.

FIRE HAZARDS AND PLASTICS

Foster Dee Snell, president of Foster D. Snell, Inc., Brooklyn, N. Y., told members of the Michigan Fire College at Ann Arbor last summer that no new hazard has been introduced into the work of firemen by modern synthetic resins and plastics.

Reporting on a thorough investigation of what happens in the burning of plastics under the conditions commonly met in fires, Dr. Snell told the fire fighters, "I can find no hazard in 1946 which did not exist in 1936, in 1919, and in 1896.

"A number of toxic gases may be produced by the destructive distillation or partial combustion of plastics, but all of these gases with one exception — hydrogen chloride — are also produced by the partial combustion of such familiar materials as wood, leather, silk, wool, and fats. All of these, as well as the plastics, give carbon monoxide as the major product of partial combustion. This gas still constitutes the chief hazard to fire fighters exposed to the

(Continued on page 20A)

Calling ALL SHOP TEACHERS!

Enter your Students in this

ALUMINUM PROJECTS COMPETITION

Your Industrial Arts students will really spark to the idea of signing them up in the Aluminum Projects Division of Scholastic Industrial Arts Awards . . . a program sponsored by Scholastic Magazine and Aluminum Company of America.

The useful and artistic articles shown here are but a few of the many that students will enjoy making. And in the making, they will be learning to work with the foremost *light metal*, aluminum. This knowledge will be useful to them when they are through school. Before that time, they can compete for the 36 cash prizes offered in this competition.

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WRITE FOR THE RULES BOOKLET for Scholastic Industrial Arts Awards: Scholastic Awards, 220 E. 42nd Street, New York 17, New York.

SEND FOR THE LIST OF BOOKLETS which tell how to make things of aluminum, and a list of sources of aluminum needed for your projects. Write Aluminum Company of America, 1773 Gulf Building, Pittsburgh 19, Pennsylvania.

★ ★ ★

HERE ARE THE 36 PRIZES FOR Aluminum Projects in Scholastic Industrial Arts Awards

GROUP I—Junior High Schools, First Prize, $50; Second Prize, $25; Third Prize, $10; nine Honorable Mentions, $5 each.

GROUP II—High Schools offering less than 10 hours per week. First Prize, $50; Second Prize, $25; Third Prize, $10; nine Honorable Mentions, $5 each.

GROUP III—High Schools offering more than 10 hours per week. First Prize, $50; Second Prize, $25; Third Prize, $10; nine Honorable Mentions, $5 each.

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on the same Modern Equipment

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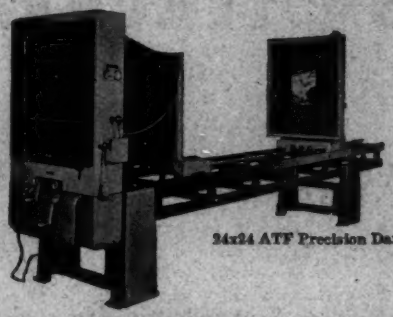
An ATF Offset Department is essential to the modern Vocational School Print Shop



24x24 ATF Precision Darkroom Camera

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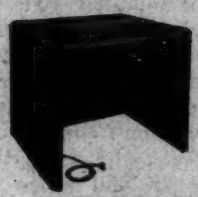

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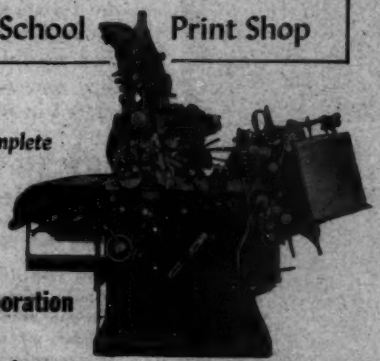

ATF Chief 22 Offset Press

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(Continued from page 18A)

fumes from a smoky, smoldering fire. Other toxic gases, given off by both plastics and the older, more familiar materials are normally produced in small concentrations as compared with that of carbon monoxide. Even though carbon monoxide might be less toxic than some of the others at the same concentrations, its greater amount and concentration under most conditions more than make up the difference.

"The important toxic gases which may be produced from both old and new materials are formed only under the same conditions as dense smoke, and — again with exceptions — are destroyed in a freely burning flame. The fumes so produced may include formaldehyde, hydrogen cyanide, hydrogen sulphide, ammonia, acrolein, and carbon monoxide, all of which are converted into harmless products in the complete combustion of a free flame. Hydrogen chloride or the chlorine formed from it (products of certain vinyl and vinylidene resins) and sulphur dioxide (from rubber and wool) are not burned to harmlessness in a free flame and the only way to get rid of them is to flush them away with a draft to the outside air. Such a draft serves the dual purpose of helping burn up some toxic compounds and of flushing out others.

"Curiously, we hear a great deal about the dangers of new materials, when the fact is that the oldest plastic, celluloid, is the most hazardous and the newest, the silicones, melamines, and Teflon, are the safest."

Personal News

♦ CLAYTON E. BUELL has been appointed editorial assistant in the curriculum office of the Philadelphia public schools where he will be editor of all curriculum materials in both elementary and secondary schools published by the school district of Philadelphia. He assumed his new duties on September 1, after having been co-ordinator of vocational education at Edward Bok Vocational School, Philadelphia, where he had co-ordinated the regular day school program and, during this past summer, the veterans' education program. At both Bok Vocational School and the U. S. Naval Base, Mr. Buell had done both teaching and curriculum work in the vocational education field.

Mr. Buell is the author of *Mathematics for the Sheet Metal Worker*, and also has written for educational magazines. He is now doing graduate work toward his doctor's degree at the University of Pennsylvania.

♦ CALVIN S. HATHAWAY, recently returned after years of army service, has been appointed curator of The Cooper Union Museum for the Arts of Decoration, Cooper Square, New York 3, N. Y.

As the head of this famous old museum, Mr. Hathaway will hold the academic title of associate professor of decorative arts.

Before his enlistment in the army, Prof. Hathaway was for eight years the associate curator of The Cooper Union Museum. Following his graduation from Princeton and his graduate work at Harvard, he had been associated with the Philadelphia Museum of Art, where he was in charge of the Department of Decorative Arts and of the "Colonial Chain" of old houses in Fairmount Park.

♦ A. H. WINTER, day trade machine-shop instructor at Topeka, Kans., for the past five and one-half years, has retired. Mr. Winter reached retirement age three years ago and has announced his retirement at the end of each year since then. Each new school year has found him back on his old job, however, because the school could not locate a successor. Mr. Winter came to Topeka in 1905.

♦ RICHARD ERNESTI, an old pioneer in the fields of art and industrial arts, died Saturday, September 21, in Seattle Wash., where he had lived since 1930.

Before his retirement he taught art at Colorado Springs, Colo., and was supervisor of art at Denver, Colo.

He was a member of the Western Arts Association, the Puget Sound Art Group Painters, and of the Delta Phi Delta Fraternity.

♦ FLOYD W. LEE, who for the past 27 years has been industrial-arts teacher and department head at Pekin Community High School, Pekin, Ill., passed away at his home on July 31.

Mr. Lee was a lieutenant in the army air corps in World War I. He devoted a large share of his lifetime to the betterment of youth in this community. His influence in the training of boys and his assistance to them in their work has gained their highest esteem.

Mr. Lee was granted the degree of bachelor of science at Bradley Polytechnic Institute, Peoria, Ill., and the degree of master of science by The Stout Institute, Menomonie, Wis.

During World War II he not only carried out his duties as an industrial-arts teacher, but also was supervisor of trade and industrial education for his community.

He is survived by his wife and three sons.

♦ GEORGE S. STEWART, for five years a metal trades and machine-shop instructor at Pekin Community High School, Pekin, Ill., has been appointed department head of the industrial-arts department and co-ordinator of trade and industrial education for that school. He succeeds Floyd W. Lee who passed away recently.

♦ CALVIN M. STREET has returned to the faculty of Memphis State College as assistant professor

(Continued on page 22A)

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Delta 14" Wood and Metal Cutting Band Saw

Delta 17" Drill Press (for metal, wood, or plastics)

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Here are photographs and layout drawings of 30 typical shops, for schools large and small. These are floor plans of shops that have been built and proven practical in regular classroom use.

To further help you keep well-informed on planning and equipping the school shop for economy, safety, convenience, and teaching efficiency, this authoritative book also contains:

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(Continued from page 20A)

of industrial arts, in which capacity he is teaching metalwork and electricity. He has spent the past six months at the University of Tennessee, where he was granted an M.S. degree. Previous to this period of study, Mr. Street was in the armed forces for four years.

♦ DALE ROBERTS, formerly instructor in the industrial-arts department of Maine Township High School, Des Plaines-Park Ridge, Ill., has been appointed assistant supervisor of industrial arts in the state of Illinois board for vocational education, Springfield, Ill.

♦ HUGH P. HARSHBARGER, formerly of the Maine Twp. High School, Des Plaines, Ill., is now serving in the capacity of assistant chief of education and training, Veterans Administration Branch Office, St. Louis, Mo. As one of 13 offices decentralized from Washington, this branch has supervision over the four states of Oklahoma, Kansas, Missouri, and Arkansas.

♦ CHARLES L. ANSPACH, president of Central Michigan College of Education, and A. Douglas Jamieson, vice-president of the Detroit board of education, recently received the Silver Antelope, highest award of the Boy Scouts of America, in recognition of outstanding service to scouting.

♦ JOHN L. FEIRER, assistant director of vocational education, and in charge of industrial arts education at Western Michigan College of Education, was granted the degree of doctor of education July 30, by the graduate school of the University of Oklahoma.

♦ ROBERT E. SHARER, chief of adult and extended education, Michigan State Department of Public Instruction, attended the first national conference of state directors of adult education, West Point, N. Y., September 25, 26, and 27. Mr. Sharer was a member of the committee on arrangements for the event.

♦ STANLEY E. DIMOND, director, Citizenship Education Study of Detroit public schools, was the chairman of a committee of The National Council for the Social Studies which has prepared a 381-page volume, *Democratic Human Relations*, based on outstanding school practices in intergroup and intercultural education.

♦ WORTH MCCLURE, president of the American Association of School Administrators in 1943, became executive secretary of the organization July 1, 1946. He succeeds S. D. Shankland. The next annual convention of the American Association of School administrators will take place at Atlantic City, N. J., March 1–6, 1947.

♦ CECIL E. STANLEY, supervisor of distributive education in Nebraska, was guest instructor in the distributive education teacher-training program at Kansas State Teachers College, Emporia, Kans., during the second half of the summer session. He taught Co-ordination Problems and Techniques, and Organization and Administration.

♦ H. D. SHOTWELL, instructor-co-ordinator of the office training program, Topeka, Kans., received the degree of master of education at Colorado A. & M. College, Fort Collins, Colo. Congratulations!

♦ WM. (BILL) SKELTON has been appointed retailing co-ordinator of Wichita High School East, Wichita, Kans.

♦ WILLIAM A. DEVETTE, formerly teacher of drafting at the Technical High School, Erie, Pa., has been appointed instructor of drafting at Muskegon Junior College, Muskegon, Mich.

♦ A. ROLAND ELLIOTT succeeds Frank Fee as day trade and industrial-arts printing instructor at Hutchinson, Kans. The latter has retired from the teaching profession. Mr. Elliott comes to Hutchinson from Tonkawa, Okla., where he was instructor of printing.

♦ P. E. OBERHOLTZER is instructing the day trade refrigeration and air conditioning program at Kansas State Teachers College, Pittsburg, Kans. He was formerly day trade electrical instructor at Wichita.

♦ R. R. REED, machine-shop and auto-mechanics instructor, Salina, Kans., attended a four-week session of the General Motors School at Flint, Mich.

♦ JOHN POGSON has been appointed day trade machine-shop instructor at Topeka, Kans.

Association News

♦ The American Society of Training Directors held its second annual convention in Pittsburgh, Pa., October 17–19, with R. O. Boden as chairman.

The meeting was devoted to general sessions and sectional meetings, each in charge of a chairman. The Veteran Training Section, under Roy G. Fornwalt, discussed apprentice training and industrial tests and techniques; the safety section took up The Relationship of Training and Safety; another section discussed Office Supervisory Training, with R. C. McConnell as the speaker; and still another section considered Railroads and Employee Training, with L. W. Horning as the speaker.

♦ The theme of the 21st Annual Conference on Printing Education, held at the Benjamin Franklin Hotel, Philadelphia, Pa., June 13, 14, and 15, was "Graphic Arts Education in the First Year of Peace." The program, as announced, was made up of four conference sessions and the annual Conference dinner. The topics selected for discussion were:

I. Modernization of Courses of Study, of School Plants, and Promotional or Guidance Programs
II. Lessons Learned From the War for Use in Peacetime Education
III. Veterans' Training "On-the-Job" and School Training
IV. Students Activities Programs
V. Printing and Education Are Inseparable

Co-operation in the preparation and arrangements for the conference was given by the public school system of Philadelphia and by the local industry. Financial assistance was extended by

(Continued on page 25A)

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masterpieces of America's foremost film producers, a great variety of educational films, and dozens of short subjects and cartoons are cataloged in this book. Every one is available from Films Incorporated for showing on 16-mm school projectors. By making cancellable-film-reservations immediately, you can assign to films an important part of your program burden.

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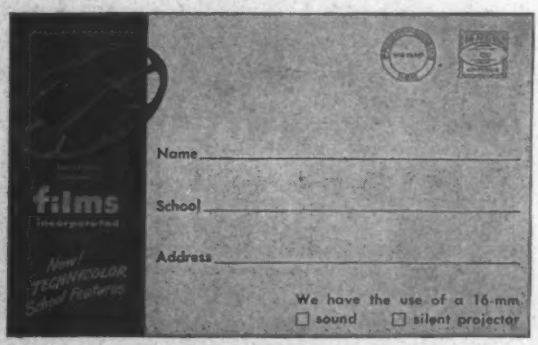

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Chicago 1—64 E. Lake St. ■ Portland 12, Ore.—611 N. Killamook St.
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By John F. Friese, professor of industrial arts education, Pennsylvania State College, State College, Pennsylvania.

Worked up through years of solid practice. The result of exposing student groups to experimental course plans and finding out which were most effective and which were not. A book now published for commercial sale only after the author had tested every principle in a special edition used widely throughout the country.

Five actual abstracts of typical formats, prepared by former students trained under the author—and based on the first special edition of his book—are reproduced in this new, greatly enlarged edition. Sound of definition, sure in its coverage of all important phases—history; course scopes and format development; philosophy; aims analysis; content, method, management; organization; curriculums—how each part of a healthy program in vocational or industrial arts education is extracted from the general content into an efficient course of study. Easy to use; direct, clear, and logical in every development. Probably $3.50.

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Selvidge and Fryklund $3.00
TEACHING THE INDUSTRIAL ARTS—*Ericson* 4.00
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Bennett Vol. I. 4.00
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Simple and completely explained machine operations give each trainee in the class an extensive machine shop training. Individual projects created through the making of various parts for a full-sized machine capture the interest of the entire class. To fully appreciate the hidden value of this program you must try it. *Special introductory offer. Order early to insure delivery for fall term. Please mention this magazine in submitting your request.*

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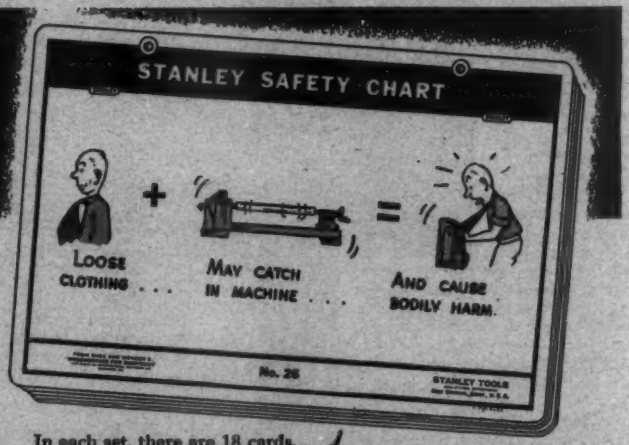


A Series of 36 Pictorial Wall Charts to Promote Safety in the Use of Tools and Machines in School Shop

It is important that your students – the skilled tool users of tomorrow – be trained in ways of safety as they learn the use of tools and machinery. These charts put this idea across with simple, graphic emphasis. To promote safety in schools, as well as in future work, Stanley offers this series of charts at cost of printing and postage. No finer investment could be made in school shop training. ORDER A SET TODAY!

In each set, there are 18 cards, printed in colors on two sides – 36 charts in all. Charts are mounted on heavy cardboard, lacquered for easy cleaning, and have metal grommets for hanging.

$2.50 postpaid in the U.S.A. In Canada*, $4.10 a set postpaid.

STANLEY TOOLS, NEW BRITAIN, CONNECTICUT
THE TOOL BOX OF THE WORLD
STANLEY
Trade Mark
HARDWARE · HAND TOOLS · ELECTRIC TOOLS

Stanley Tools, Educational Dept., IA-1146, New Britain, Conn.
Enclosed is $2.50. Please send postpaid the complete set of STANLEY SAFETY CHARTS. (*In Canada $4.10 postpaid. Check or Money Order payable in Canadian Funds must accompany order. Shipment to be made from Stanley Tool Co. of Canada, Ltd., Roxton Pond, Quebec.)

Name.....
School Name.....
Address.....
City..... *State*.....

A CHRISTMAS GIFT
TO DELIGHT A YOUNG BROTHER OR SISTER

Just in time for Christmas is this toy which your students can make in the school shop.

Eldoradostats (from which you can make as many blueprints as needed) of both problem and solution are now being mailed to instructors on our mailing list. If your name is not on our list, write Dept. 128-J11 now for this timely drawing. No obligation.

Incidentally, your students will do this, and following studies, better with Eldorado pencils. No others have Typhonite leads.

DIXON'S
TYPHONITE
ELDORADO

SCHOOL BUREAU, PENCIL SALES DEPT. 128-J11, JOSEPH DIXON CRUCIBLE CO., JERSEY CITY 3, N. J.

(Continued from page 22A)

Printing Industry of America, Inc., by 26 members of the printing industries of Philadelphia, and by several individual industrial backers.

Another restoration of a peacetime activity of more than ordinary interest is the association yearbook. The last yearbook, dedicated to John Clyde Oswald, was issued in 1939. The current publication is dedicated to the late Edward E. Sheldon, a pioneer in graphic arts education. The book is being designed, printed, and bound by C. Harold Lauck of Washington and Lee University.

The Annual Printing Education Week, under the chairmanship of Joseph F. Sorace of the Rochester Institute of Technology, is gradually becoming known as National and International Franklin Week. Franklin celebrations were more widespread than ever in schools and industrial circles.

The Tenth Annual Essay Contest, sponsored jointly by the Association and International Printing Ink, adopted the timely general topic, "Printing and World Peace." The enlarged program of prizes, totaling $2,200, included a special tenth anniversary prize of $1,000 for the best printed essay.

The eighth student newspaper typography contest was conducted in co-operation with the Columbia Scholastic Press Association, Columbia University. As in the past several years, the student publications were put on display at the New York School of Printing. The winners received certificates of merit, donated by the educational department of the American Type Founders.

The International Junior Benjamin Franklin Society, now consisting of 38 chapters in the leading printing schools of the United States and Canada, is sponsored jointly by the Association and International Benjamin Franklin Society, Inc. From reports received, most of the local chapters put on outstanding Franklin programs during the 1946 Printing Education Week.

♦ The first postwar National Safety Congress and Exposition was held in Chicago, Ill., October 7–11.

Interest in safety is at an all-time peak, because Americans are realizing more than ever before the human and material waste represented by the 96,000 accidental deaths and the $5,100,000,000 economic loss of last year.

Recommendations on safety education as proposed by the President's Highway Safety Conference high lighted some of the school and college meetings.

The headquarters were at Hotel Stevens, with meetings also held at the Palmer House, the Hamilton Hotel, and Congress Hotel.

♦ The Connecticut Industrial Arts Association is holding its annual fall convention October 25 and 26 in Bridgeport. Convention headquarters will be located at the Bassick High School, Bridgeport.

Dr. Verne C. Fryklund, president of The Stout Institute, Menomonie, Wis., will speak at the dinner meeting on the evening of October 25 on the subject "What Does Today's Industrial Arts Expect of Its Teachers?" Written questions from the audience will be collected and used as the basis for the discussion following the luncheon meeting on October 26. Dr. Fryklund will also lead this discussion.

Exhibitors will be on hand from Friday, October 25 at 8:30 a.m., to Saturday, October 26 at 2:30 p.m.

For information concerning reservations, write Ernest W. Rider, 1403 E. Main St., Bridgeport 8, Conn.

♦ E. Keeler Company, 315 W. Third St., Williamsport, Pa., presents Williamsport's 1946 Educational, Industrial Exhibition, which is sponsored by the Williamsport Technical Institute; West Branch Manufacturer's Association; and Members of the American Society of Tool Engineers.

The exhibit will be held October 21, 22, 23, and 24, 1946.

SIMULTANEOUS ARC WELDING AND FLAME CUTTING

The accompanying illustration shows an interesting method of preventing distortion during a multiple torch cutting operation. After the four torches of the 6A Ozygraph have

(Continued on page 29A)

Simultaneous arc welding and flame cutting

"JO-BLOCKS" make precision an easy lesson

Setting a snap-gage to millionth-inch accuracy for a camshaft inspection.

Setting a sine-plate for precision inspection of an angle or taper.

PRECISION shop measurement can be learned only by making precision measurements. The day when the micrometer caliper set the metes and bounds of attainable accuracy is past. Its passing was foreshadowed when Ford Motor Company made Johansson Gage Blocks available to all industry in America at moderate cost.

Jo-Blocks Are Made to Warranted Accuracy Standards of .000002", .000004" and .000008" ±

Now, the gage block is the very cornerstone of precision manufacture. And the "JO-BLOCK," which pioneered millionth-inch accuracy, is the trusted guardian of dimensional exactness in scores of famous factories.

Give your students the opportunity to become familiar with the handling and use of JO-BLOCKS! For about the cost of a good workbench, your school can acquire a minimum working set of genuine JO-BLOCKS at the factory or through any Johansson distributor. Their uncanny cohesiveness and jewel-like surfaces will fascinate the student —instill lasting respect for true accuracy and the vital part it plays in low-cost mass production.

WRITE FOR THESE FREE BOOKLETS

"He Measured in Millionths," an interesting monograph on the achievements of Carl Edvard Johansson, will be useful to you in teaching. Yours for the asking, with the new illustrated Jo-Block Catalog.

Write:

FORD MOTOR COMPANY

Johansson Division, Dept. 411, Dearborn, Mich.

Ford

Johansson

GAGE BLOCKS

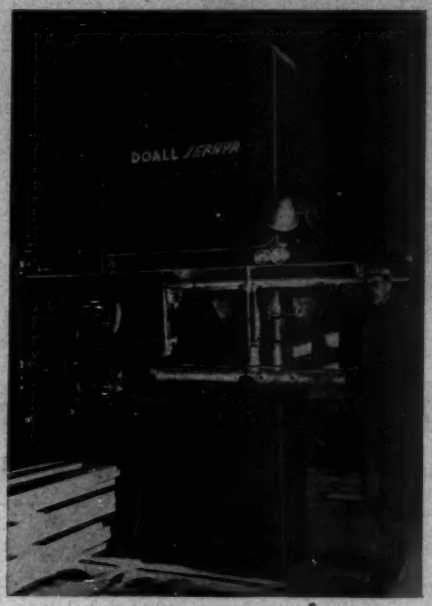
Shop Equipment News

New Products — Publications

NEW DOALL RESAW ATTACHMENT

A resaw attachment for use on their Zephyr model 36 has just been announced by The Do-All Company, 1301 Washington Ave., South, Minneapolis 4, Minn.

The attachment bolts directly onto the column of the band saw and when not in use swivels out of the way so the saw can be used for scroll work and other band-saw applications.



Resaw attachment

The most outstanding feature on this resaw is the variable speed drive. This drive gives the operator complete control over the rate of feed ranging from 0 to 30 feet per minute.

Equipped with thin blades, this resaw on the DoAll Zephyr accomplishes considerable savings in expensive lumber. Accuracy of the attachment is such that the variation from absolute squareness in full capacity cuts is less than .002 in. Runout is also less than .002 in.

The DoAll Resaw takes material up to 12 by 12 and is electrically driven on four feed rollers. Idler rollers are kept in position against the work by strong spring tension. Indexing of cut is done by means of a calibrated wheel.

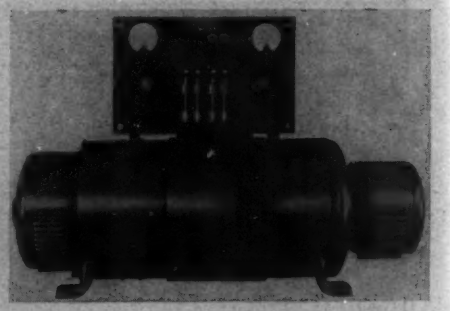
This firm has also published recently a book illustrating many industrial jobs which can be done at a great saving of time on DoAll equipment. Copies can be had for the asking.

For brief reference use IAVE—1810.

MGC LOW-VOLTAGE ELECTROPLATING GENERATORS

A complete new line of low-voltage electroplating generators has been announced by Motor Generator Corporation, Division of the Hobart Bros. Co., Hobart Square, Troy, Ohio.

The line includes six models, ranging in size from 100 amperes at 6 volts, to 2000 amperes at 6 volts, or 1000 amperes at 12 volts. The No. 130 model, which is rated 1000 amperes at 6 volts or 500 amperes at 12 volts, is driven by a 10-horsepower motor at 1200 r.p.m. The model is popular with the job shop and manufacturer where still plating tanks are used for nickel, copper, brass, or cadmium. For chromium plating, individual 1000 ampere, 60-volt generators are used right at the tank. The machine is compound



Electroplating generators

wound, equipped with interpoles or commutating poles which insure sparkless commutation. Special metallic brushes carry the high current with minimum loss. Commutators of ample design, with riveted risers, cause a marked draft, insuring cool commutation. Circular is available upon request.

For brief reference use IAVE—1811.

NEW DELTA-MILWAUKEE COOLANT PUMP AND TANK

The Delta Mfg. Division of the Rockwell Mfg. Co., 600 E. Vienna Ave., Milwaukee 1, Wis., has added to its line of power tools a new coolant pump, which offers many advantages on machines requiring a free flow of coolant.

New coolant tank and pump

The coolant pump, which is exceptionally low in cost, is highly adaptable because of a flat machined flange, permitting its use on wet machine tools. It has a wide capacity, up to 30 gallons per minute at low heads, and will deliver up to 2 gallons per minute to a 14-foot head. The ¼ h.p. motor is fully enclosed and double sealed, lubricated for life ball bearings, is neat and simple in construction, portable, and requires a minimum time for installation. Prints are available upon request.

For brief reference use IAVE—1812.

NEW VACUUM TUBE ANALYZER

A new vacuum tube analyzer which tests tubes precisely as they are used has been announced by the Weston Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, N. J.

Known as the Model 686, this true mutual conductance vacuum tube analyzer contains a well-filtered a.c. and d.c. potential supply, meters for standardizing each element voltage and

(Continued on page 28A)

One stands out ALL WAYS

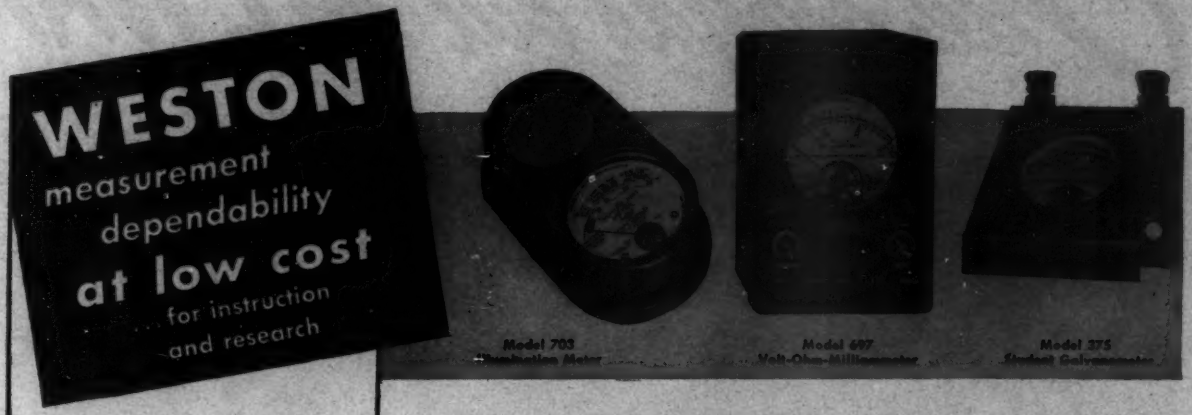
You can recognize a Plumb tool when you look at it, hold it or work with it. You can see the sleek one-piece steel head—flawlessly tempered from special analysis steel—and the red handle, turned from straight grained tested hickory.

You can feel the perfect balance, a scientific accomplishment in fine tool making, and grasp the carefully-shaped comfort-grip handle. And finally, when you use a Plumb you'll know it instantly by the ease with which it works, the quick, accurate strokes, the speed and power of every blow. By every test Plumb Tools stand out, all ways. Fayette R. Plumb, Inc. Philadelphia 37, Pa.

Quality Comes FIRST
PLUMB
is FIRST in Quality

PLUMB

HAMMERS • HATCHETS • AXES • SLEDGES



Other WESTON School Favorites

All-Metal Laboratory Thermometers —with easy to read dial—rugged all-metal construction—accuracy within ½ of 1% full scale.

Photronic (photo-electric) *Cells* —dry disc type cells of high output, famous for their stability.

Model 697 is a low-cost Volt-Ohm-Ammeter combining a selection of AC and DC voltage, direct current and resistance ranges in a compact, pocket-size case.

Model 375 galvanometer is preferred wherever extreme sensitivity is not essential, because of its durability and low cost. Other models of higher sensitivity, also available.

Model 703 is a low-cost, pocket-size Illumination Meter which gives direct reading in foot-candles. Available with WESTON VISCOR filter for direct measurement of any light regardless of color composition.

In the physics laboratory, or the vocational classroom, students best acquire habits of precision by using precision equipment. WESTONS not only fulfill this requirement, but they cost far less in the end, too. Literature on WESTON instruments gladly sent on request.

Laboratory Standards . . . Precision DC and AC Portables . . . Instrument Transformers . . . Sensitive Relays . . . DC, AC, and Thermo Switchboard and Panel Instruments.

WESTON

Specialized Test Equipment . . . Light Measurement and Control Devices . . . Exposure Meters . . . Aircraft Instruments . . . Electric Tachometers . . . Dial Thermometers.

WESTON ELECTRICAL INSTRUMENT CORP., 595 FRELINGHUYSEN AVENUE, NEWARK, N. J.

(Continued from page 26A)

current, a grid current microammeter, and a large fan-shaped instrument calibrated in mutual conductance with ranges of 3000, 6000 and 15,000 microhms.

The upper portion of the Model 686 contains a separate socket panel with each tube element terminated at a separate pin jack. All power supply and metering circuits terminate in a second set of pin jacks. Patch cords are used to connect any tube for analysis. External circuit components may also be patched in for study purposes.

For brief reference use IAVE—1813.

16MM. SOUND FILM ON THE WET BELT MACHINING METHOD

A film on the wet belt machining method of surfacing, grinding, and stock removal is now available to engineers, design and production executives, planning and methods engineers, toolroom and die room foremen, and all other interested members of the metal industry. The film is sent free upon request for private or group showing.

This visual presentation shows: removing risers, flashings and parting lines from cast materials; surfacing large, flat areas to close tolerance; chamfering, edging, squaring, rounding, and cutting radii on single piece operations. The automatic feed table, supplying mechanical pressure for hand pressure and with which .0005-in. tolerance is attainable, is visually presented.

The film is obtained at no cost except return postage from the Porter-Cable Machine Co., 1714 North Salina Street, Syracuse, N. Y.

For brief reference use IAVE—1814

NEW SLIDE FILMS

"Behind the Counter," a completely new and up-to-date series of sound slide films for training retail sales personnel is announced by The Jam Handy Organization.

Five sound slide films comprise the series. They cover: (1) friendliness; (2) attentiveness; (3) helpfulness; (4) sincerity; (5) enthusiasm. Retail merchandising and personnel experts from some of the largest department stores in the country contributed helpful advice and counsel during the course of production. The series can be used as the basis for a retail training course; or, may be integrated with any program now in operation. For details, address The Jam Handy Organization, 2822 East Grand Boulevard, Detroit, Mich.

For brief reference use IAVE—1815.

A HELPFUL MANUAL

"Grinding Facts" is a very helpful manual recently made available by The Carborundum Company, Niagara Falls, N. Y.

This handy little book gives full information on how to select, identify, use, and care for grinding wheels of all kinds.

It also describes the various types of toolroom sticks, coated abrasives, and cutting off wheels that are made by the firm.

There are 136 pages of this useful information.

This firm also publishes a grinding wheel catalog which describes the full line of its products.

For brief reference use IAVE—1816.

CRAFTSMAN'S PROJECT BOOK

This book titled "Pleasure and Profit with a Handee" contains easy working plans for making many interesting and useful projects. Regular price, 25 cents, but it will be sent free to teachers. Write to Chicago Wheel and Mfg. Co., 1101 W. Monroe St., Dept. IA, Chicago 7, Ill.

For brief reference use IAVE—1817.

THE X-RAY IN INDUSTRY

A new 4-page booklet (No. R1023), entitled "X-ray As a Foundry Control Tool," has been announced by North American Philips Co., Inc., 100 East 42nd St., New York City.

The text material was written by George Mullowney, industrial radiologist, who describes in detail the principles of operation together with informative cost analyses. Specific topics covered include how x-rays are produced, equipment costs, small casting production, fluoroscopy, personnel, and operational costs.

The booklet pictures 6 radiographs which show the most common defects encountered in magnesium castings. Additional drawings and charts make the subject matter easy to understand. The booklet is a reprint of an article which appeared in a trade publication, and may be obtained gratis.

For brief reference use IAVE—1818.

GET THIS LITTLE BOOKLET

An interesting booklet, titled "What Do G.M. Diesels *Do*?" has been made available without charge to all teachers for distribution among their students. To get your supply write to Detroit Diesel Engine Division, General Motors Corporation, Product News Department, Detroit 23, Mich.

For brief reference use IAVE—1819.

HELPFUL CATALOGS

The Craftsman Supply House, 35 Browns Ave., Scottsville, N. Y., have just published the following catalogs:

"Phenolic Plastics" (Catalin), sheets, rods, cylinders, castings, various shaped slices, and ring blanks.

"Acrylic Plastics" (Plexiglas), in sheets both clear and colored.

"Cameos" for earrings, pins, bracelets, rings, and pendants.

These catalogs also describe sanding disks, ashing materials, buffing wheels, cements, accelerators, drive screws, buffs, and the like.

For brief reference use IAVE—1820.

1946 RADIO BUYING GUIDE

"Everything in Radio and Electronics" is the name of the 1946 Buying Guide published by the Allied Radio Corp., 833 West Jackson Blvd., Chicago 7, Ill.

(Continued on next page)

(Continued from previous page)

Included in it are complete listings of electronic tubes, test instruments, transformers, resistors, condensers, rheostats, relays, switches, rectifiers, batteries, sockets, generators, and power supplies.

Address and intercommunication units, microphones, speakers, etc., also are listed.

For brief reference use IAVE—1821.

CINCINNATI'S NEW CATALOG

A new catalog, No. M-1420, has just been published by Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio.

The catalog describes and illustrates all of the millers, broaching machines, cutter sharpeners, and grinding and lapping machines, made by this firm.

The 60-page booklet contains numerous cuts showing the various types of power tools, specific descriptions, and general specifications which help the reader in visualizing the machine in which he may be interested.

A copy of the catalog may be obtained by writing to the manufacturer at the address given.

This firm also has available a 32-page booklet titled "Engineering Data" which describes the centertype grinding machines manufactured by them.

For brief reference use IAVE—1822.

OPENS DIRECT FACTORY SALES AND SERVICE OFFICES

The Kearney and Trecker Corporation, Milwaukee 14, Wis., manufacturers of Milwaukee Rotary Head milling machines, Migetmills, Speedmills, face mill grinders, and Autometric boring machines, have announced the opening of the following direct factory sales and service offices at Detroit, Cleveland, and Pittsburgh.

The Detroit, Mich., office will be located at 4363 Woodward Ave., Royal Oak, with Messrs. William J. Mirgeler and Walter S. Ryan in charge.

The Cleveland, Ohio, office is located at 1426 B. F. Keith Building, and the Pittsburgh, Pa., office at 925 Frick Building.

The Cleveland and Pittsburgh offices will be directed by John E. Brennan.

SNAP-ON-TOOLS CORPORATION OPENS NEW PLANT

The Snap-on-Tools Corporation, Kenosha, Wis., has recently opened a new plant at Long Branch, Ontario, Canada. This plant will supply a majority of the Canadian tool needs and allow the firm's three American factories to concentrate on tool demands.

Now in its twenty-sixth year, Snap-on-Tools Corporation had its beginning in a two-story factory in Milwaukee, Wis. Space limitations forced the firm to move to Kenosha in 1930. Four additions have since been made to the home plant, including the new $100,000 factory and administrative building. A program of decentralization was begun in 1937 with the opening of a plant in Mt. Carmel, Ill. A third branch was added in 1945 with the acquirement of the Forged Steel Products Company of Newport, Pa.

ARC WELDING AND FLAME CUTTING

(Continued from page 25A)

made their cuts in the outer edge of the ½-in. steel plate, the welder, using an Airco No. 81 electrode, follows along, making tack welds at the point of entry, thereby restoring the steel to one continuous strip and precluding the possibility of *walking* or *lifting*.

The photograph was taken by the Air Reduction Sales Co., at the Service Welding Company's shop in Ridgefield, N. J.

BACTERIOLOGY AIDS BLAST FURNACES

Hot weather brings problems other than mere physical discomfort for the makers of iron and steel.

An average blast furnace requires a large

(Continued on page 31A)

Now Off The Press

REVISED AND ENLARGED

DICTIONARY OF TECHNICAL TERMS

1946 EDITION

By F. S. Crispin

Complete, concise, and accurate, this book is a necessity in every shop, library, and technical school. This new edition includes many new words which were coined as a result of wartime technical developments, as well as new terms and definitions in the fields of aeronautics, auto mechanics, electricity, plastics, and welding.

$2.75

Related Materials for the School Shop Library

MATERIALS OF CONSTRUCTION

By Fryklund and Sechrest

In a complete and comprehensive manner, this text offers the school shop student just the information he needs about the origin, the physical and chemical characteristics, the processes and methods of manufacture, and the various uses of the material with which he works.

$2.25

FROM FOREST TO WOODWORKER

By Noble and Everill

This book traces the steps in the production of wood products from the forest to the manufacturer. It includes excellent and accurate information on forests, conservation, lumber, plus complete data on how best to care for supplies and tools in the shop, how to become an intelligent purchaser of goods, etc. Profusely illustrated.

$2.00

Examination copies sent on 5 days' approval

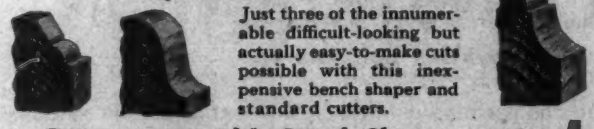
THE BRUCE PUBLISHING COMPANY

711 Montgomery Bldg. Milwaukee 1, Wis.

HOW TO GET A BENCH SHAPER out of a slim shop budget

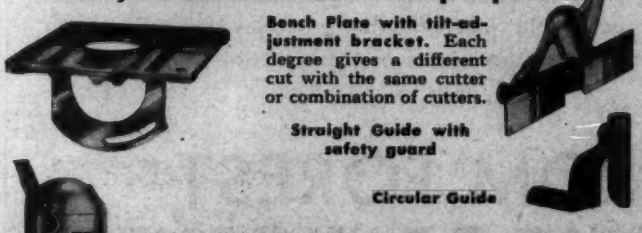
If you can spare one end of a work bench, all you need to make an all-around bench shaper for your school shop is the bench shaper plate shown below and the Stanley-Carter RS4A Hand Shaper which attaches to it. With this low-cost bench shaper your students can make an endless variety of moulding cuts... tongue, groove, chamfer, cove, rabbet and other cuts and combinations of cuts. Tilting feature angles cuts up to 45 degrees... multiplies the usefulness of this bench shaper.

Complex cuts like these . . .



Just three of the innumerable difficult-looking but actually easy-to-make cuts possible with this inexpensive bench shaper and standard cutters.

Easy-to-assemble Bench Shaper parts



Bench Plate with tilt-adjustment bracket. Each degree gives a different cut with the same cutter or combination of cutters.

Straight Guide with safety guard

Circular Guide

RS4A Hand Shaper... ⅜ h.p. universal motor, 110 or 220 volt, 60 cycles or less; collet type chuck, detachable from shaft; forced air cooling; oversize ball bearings. Threaded motor casing.

STANLEY
Trade Mark

HARDWARE · HAND TOOLS · ELECTRIC TOOLS

---SEND THIS COUPON FOR FULL PARTICULARS---

STANLEY ELECTRIC TOOLS, DEPT. C IA 11-46
New Britain, Conn.
Gentlemen: Please send information about Stanley-Carter RS4A Routers for school shop use.

Name.....
Title.....
School.....
City..... *State*.....

SHOP BOOKS

GENERAL PLASTICS by Cherry **$1.20**
Gives detailed instructions and drawings for making, polishing and assembling 42 attractive projects. Contains list of firms that specialize in plastics.

GENERAL LEATHERCRAFT, Revised 1946, by Cherry **$1.20**
Contains 35 novel projects (many new ones) with accurate instructions with drawings for making them. Gives up-to-date list of firms that can supply materials and tools.

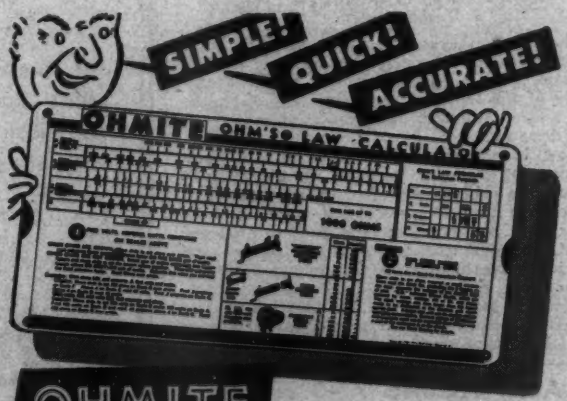
GENERAL PRINTING by Cleeton & Pitkin **$1.60**
A book of unusual merit for beginners. It simplifies the instruction on the basic fundamentals by many illustrations of difficult operations. Shows relation of printing to every-day life.

GENERAL BOOKBINDING, Revised 1946, by Groneman **$1.00**
A simple manual with emphasis on binding magazines and other school forms. Gives instruction for the construction of equipment. A new chapter on care of books.

PRACTICAL SIGNS & POSTERWORK by Harshbarger **$1.00**
An ideal book for individual use for a beginner. Thoroughly illustrated to show good balance and practice.

Write for approval copies.

McKNIGHT & McKNIGHT
BLOOMINGTON, ILLINOIS



OHMITE
OHM'S LAW CALCULATOR
Solves Any Ohm's Law Problem with One Setting of the Slide

Used everywhere today! *Set the slide—read the answer.* Figures ohms, watts, volts, amperes—quickly, easily. No slide rule knowledge necessary. All values are direct reading. Simplifies solution of electrical problems. Send only 10c in coin to cover handling and mailing. 10¢

Available in quantities

OHMITE MANUFACTURING COMPANY
4861 Flournoy Street · Chicago 44, Illinois

Be Right with OHMITE
RHEOSTATS · RESISTORS · TAP SWITCHES

(Continued from page 29A)

amount of water each day equivalent to approximately a day's supply for a city of 30,000. In many cases the water to be used in the furnace is drawn from open rivers and streams. It must be treated almost as carefully as the water supplied the public for drinking.

Raw water, directly introduced into the coolers and from there into the cooling system, would rapidly foul the many feet of pipe in the furnace jacket and force the shutdown of the furnace.

The foreign matter in the water that causes most of the trouble is a minute vegetable organism, an alga. It is readily noticeable on stagnant waters in the form of scum. In hot weather, when the temperature of the water in an open stream may reach 100 degrees, the algae grow rapidly. These tiny organisms adhere to the pipe walls and clog the system in a short time. The pipes must then be cleaned for efficient operation.

Under the standard water treatment, the supply is first screened to take out leaves, twigs, and other debris. The algae are killed by chlorination. In cold weather, about five parts of water are needed. In summer weather, the amount of chlorine is doubled. Other algicides are also used, depending on whether or not the water will be returned to a source that might later be used by a public water system.

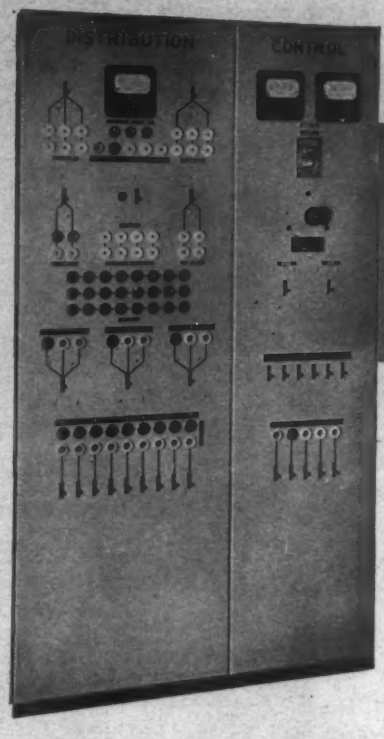
Many pig iron producers and steel companies now have consulting bacteriologists on their pay rolls. The resulting teamwork has in many cases greatly increased the life of equipment. — *Steel Facts.*

News Notes

♦ William F. Patterson, director, Apprentice-Training Service, U. S. Department of Labor, Washington, D. C., calls attention to the fact that while the plastering and finishing trades have made some progress in the way of apprenticeship during the past year, there still appears to be a demand for skilled workers for the national building program and for the postwar years ahead. The number of joint union-carpenter apprenticeship programs in the plastering and cement trades has increased from 134 in 1945 to 341 in 1946, and the number of establishments in the trowel trades with apprenticeship programs is keeping pace with the increase in the number of programs covering a city or area. These trades still need more help and do not have enough city or area-wide programs to supply the demand. There are 2042 communities with a population of 5000 or more. It is proposed that each community with a population of 5000 or more provide an apprenticeship program in the trowel trades for prospective workers.

♦ Gilbert Klecan, 14, of San Diego, Calif., has been declared the winner of the all-American soap box derby. Flashing across the finish line in a close race, the 14-year-old youth brought a stirring climax to the ninth annual running of the soapbox derby. Richard E. Zoller, Cleveland, Ohio, won second place. The winner was awarded a four-year college scholarship, donated by the Chevrolet Motor Division of General Motors, a championship trophy, and several trophies for the best brakes and the fastest heat.

♦ The MacLea School of Modern Wood Design, established in the Maryland Institute of Fine Arts, Baltimore, Md., is intended to provide training for talented students in the design of modern furniture. Students of both sexes are eligible and they must possess skill in woodwork or a related craft sufficient to execute comprehensive models. Cabinetmakers, professional furniture designers, and others in need of guidance for their work are also accepted as students.



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● Yes, that's what you do when power supplies are distributed and controlled by a Standard Electric Time Company panel system.

Laboratory panels for electrical shops in high or trade schools and colleges perform an important function in any vocational or manual arts training program. This is especially true because throughout industry similar Standard panels are in use for laboratory and testing operations. Thus there is a definite carryover value of school shop training into actual industrial practice later.

Every Standard panel is designed and built after a study of individual needs and circumstances — a custom-tailored job from start to finish.

We shall gladly have a nearby field man call on you if you will but write us mentioning this publication. 37

THE STANDARD ELECTRIC TIME CO., SPRINGFIELD 2, MASS.
Founded 1884

♦ The growing demand by veterans for trade training has caused the New York City board of education to expand its training program this fall. Courses for former servicemen are being offered this year in 16 centers in the city. More than 2000 veterans have enrolled in the pre-employment and supplementary courses being offered under the G.I. Bill of Rights.

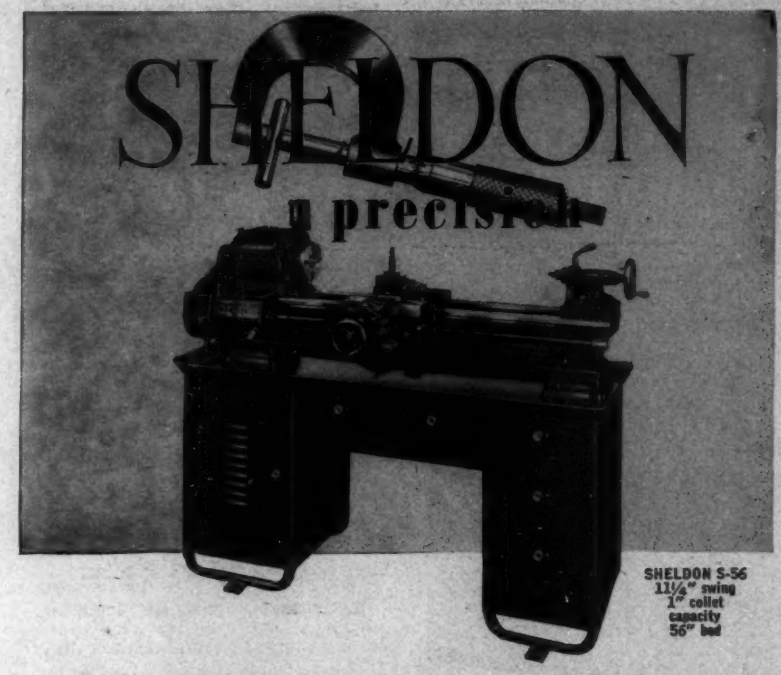
♦ Knowledge Builders, 625 Madison Ave., New York 22, N. Y., are offering a series of geometry teaching films of the 16mm. sound type, under the general title of *Practical Geometry*. The single reels deal with such subjects as *Lines* and *Angles*. Beginning with the erection of a perpendicular, the film illustrates the relationship of the perpendicular with the ordinary plumb bob, level, and square. It shows how angles are formed and how angles are measured in terms of degrees. *Congruent Figures* illustrates the geometric principles of equal sides and equal angles and clarifies methods of proving. Other phases of geometry deal with triangles, circles, chards and tangents, arcs and angles in circles, areas, and pythagorean theorem.

♦ The educational department of the Lithographers' National Association, 420 Lexington Ave., New York City, has just issued a folder entitled *Lithography's Place in Printing Production*, which fills a gap in educational literature on the use of one of the major printing processes. The purpose of the folder is to provide informational material for students in advertising and printing production courses, conducted by colleges, advertising clubs, and on-the-job training programs. Free copies of the folder are available upon request.

♦ Employment prospects in advertising, dental hygiene, and millinery are surveyed in three revised Occupational Abstracts just published by Occupational Index, Inc., New York University, New York 3, N. Y. These comprehensive 6-page leaflets are available for 25 cents each, cash with order.

♦ Veterans of World War II have better atti-

(Continued on next page)



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(Continued from previous page)

tudes toward their jobs, the boss, and the company than nonveterans. This report is made by Eugene J. Benge, president, Benge Associates, Chicago, Ill., and is based on the findings of morale surveys made by Benge's firm covering companies throughout the nation.

Mr. Benge feels that probably some of this condition can be accounted for by relief from military regimentation. He finds that morale of veterans formerly employed by other companies and of those not employed before the war is higher than that of veterans merely returning to their old jobs.

These findings emphasize the importance of alert management taking positive action to minimize the falling of veteran attitudes into the same disillusionment, real or fancied, which affects other employees of long service. This can be done in part by helping the veteran find a job for which his interests and abilities fit him.

Mr. Benge's contact with thousands of veterans has convinced him that they are most anxious to develop themselves and are hungry for practical guidance.

♦ The Washburne Trade School offers an opportunity to qualify for employment under the sponsorship of the Chicago Association of Dress Manufacturers, Chicago, Ill. The program for training skilled workers for the silk and wool dress industry includes day and evening classes. Students will be taught by qualified instructors, chosen by the association, in classrooms equipped with modern machinery direct from dress factories in this area. The silk and wool dress industry has expanded in Chicago to the point where it is second only to New York. To meet this expansion more skilled workers are needed as operators, finishers, and drapers. Therefore, the Chicago Association of Dress Manufacturers, in co-operation with the board of education, is training men and women between the ages of 19 and 30 in special classes at the Washburne Trade School.

Veterans are eligible to enroll in this course under the G.I. Bill of Rights and Public Law 16, also known as the Veterans Vocational Rehabilitation act. A job in the dress industry is guaranteed upon successful completion of the course. Those who attend day school can qualify for jobs within two to six months, depending upon the craft chosen. Graduates will be accepted as members of the International Ladies' Garment Workers' union.

Anyone interested should apply in person at the office of the Chicago Association of Dress Manufacturers, Room 985, 222 W. Adams St., between 12 noon and 1 p.m., or 4 p.m. and 5 p.m.

The Washburne Trade School continues its usual program, but considerable expansion is provided for in the fields of coeducational trade and continuation school, apprentice school, vocational and trade school, and evening school.

♦ The Children's Bureau, U. S. Department of Labor, points out in a recent statement that fewer employment opportunities are open to young workers today than a year ago, and the whole youth employment situation bears watching for it has many dangerous potentialities. This statement is based upon information brought in by the Bureau's staff from many parts of the country, and upon various reports of recent developments from many agencies concerned with youth.

The following trends in the youth employment situation are cited:

1. Young veterans generally have the preference for the better jobs, that is, jobs that have a future.

2. The high school diploma is regaining its prewar value as a job qualification. Employers once more can find high school graduates for many jobs.

3. Many employers of their own accord are raising age requirements. Personnel managers who took on 16- and 17-years-olds during the war now tend to prefer those 18 years old or over. They are "steadier." The trend is particularly noticeable as it affects jobs in manufacturing industries.

4. Part-time employment opportunities for in-school youth are shrinking. (Much of the decline in employment that has taken place so far, it is believed, is in this kind of work.) Employers now want full-time workers and can get them. Young people who are dependent upon vacation and part-time employment to meet part of their school expenses are often hard pressed, particularly so when the older workers in the family are being laid off or are temporarily unemployed in the switch over.

One group of young job seekers, the 17-year-old boys, have been having a particularly hard time of it, for many employers were unwilling to take them on a job that required any training since the likelihood was that they would be drafted before the training paid off.

Schools, labor unions, industrial groups, parent-teacher associations, and all others interested in the welfare of the nation's youth should study this youth-employment situation before it builds up into major proportions with no alternative opportunities provided for young people. Community, state, and federal action is needed in the solution of this problem.

Among the needs that must be met, are:

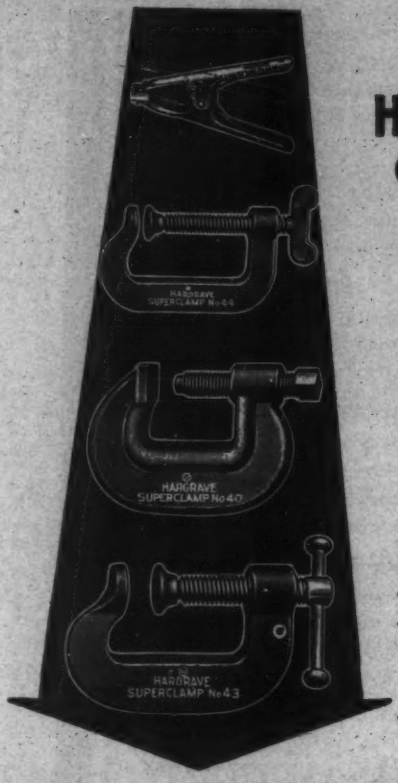
1. Some form of student aid so that no young person will have to drop out of high school for lack of funds. Ways should also be explored by which those who can profit from an education beyond the high school level may be financially assisted so that they can go on with their studies.

2. Counseling services should be given by the community so that young people, trying to decide between a job and school or about what kind of work they want to enter, may have the benefit of skilled advice.

3. Good placement service for youth to help young people find the right job.

♦ Development of Willow Run Airport into an extensive aeronautical research center is planned by the University of Michigan now that the War Assets Administration has turned the

(Continued on page 34A)



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Write for Bulletins

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Tech Training

On the day schools opened this fall, I stopped at the Corner Sweet Shop where I pick up a newspaper each evening and where the local high school boys congregate to gulp "shakes" and "feed" the Juke Box.

A thousand subjects were being excitedly discussed. Of course my ear would catch the conversation of some boys who had just drawn their new textbooks. One said, "I think I'll like this course," and tossed his only attractively bound book over to one of his gang. "Looks okay," said the others, as they thumbed through the book looking at the illustrations.

The instructor in that boy's course won't have to waste much time the first day "selling" him on the course. He is ready to go to work.

We believe that the most important thing about a textbook is the quality of the material — but we do not regret the thousands of dollars we have spent on extra-attractive and durable bindings or the thousands of hours spent on making clear, interesting illustrations. We know how much they mean to the success of the course. Instructors and students like our bright, attractive bindings, and the man who pays the bills likes the savings that come from purchasing books with durable, long life, cloth bindings.

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1. Metallurgy: Johnson. Third edition. *Just published* $5.00
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4. Automobile Fundamentals: Kuns-Plumridge. *Construction, care and repair* 4.75
5. Automobile Engines: Kuns-Plumridge. *Engines, carburetors and cooling systems* 4.75
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(Continued from page 32A)

1450-acre field over to the University. Major U. S. air lines are transferring their Detroit terminals to the Willow Run site.

♦ The Federal Government has approved transfer of Fort Brady to Michigan College of Mining and Technology for a residence center. The University of Michigan will supplement the M.C.M.T. staff so that a first-year curriculum in liberal arts, as well as engineering and science, will be available at the center.

♦ Delegates from 57 countries attended the World Conference on Air Age Education at International House, New York, August 21–28.

♦ Part-time and co-operative curriculums will be available for the school year 1946–47 at Wayne University, Detroit, Mich. The Wayne School of Education has added a two-year course for the state limited certificate, and is continuing study in connection with the College Study in Intergroup Relations in Teacher Education, and the Detroit Citizenship Education Study. Graduate assistantships in education will be available, and the university is prepared to offer a program leading to the doctor of education degree.

♦ In Battle Creek, Mich., small neighborhood meetings are held where parents may discuss with teachers and counselors the problems of their high school age children. The meetings help to define the student's needs and to point out how the high school may be more helpful.

♦ Six Michigan communities, Wayne, Wakefield, Lansing, Lakeview, Mesick, and Belding, have been chosen to take part in an experimental program in home and family education sponsored by the office of vocational education, a division of the Department of Public Instruction.

♦ Bulletins of the National Geographic Society, supplied weekly each year to teachers for a yearly subscription price of 25 cents (to cover mailing costs only) will reappear for the 1946–47 school year starting in October. Orders should be sent to the Society, Washington 6, D. C.

♦ Film strips of the picture stories in *Coronet* magazine are again offered to schools by the Society for Visual Education, Inc., 110 East Ohio St., Chicago 11, Ill., but with an important addition—eight film strips on safety education, produced by the National Safety Council.

Each month, from October, 1946, through May, 1947, those who order this service will receive two interesting and useful film strips. One will be the current picture story from *Coronet*. The other will be on safety education, prepared especially for this series by the National Safety Council, and will include such subjects as

(Continued on page 36A)

A group of G.I.'s who are continuing where they left off when they joined the armed forces.

— Photograph, courtesy of L. T. Smith, Head, Industrial-Arts Department, Western State Teachers College, Bowling Green, Ky.

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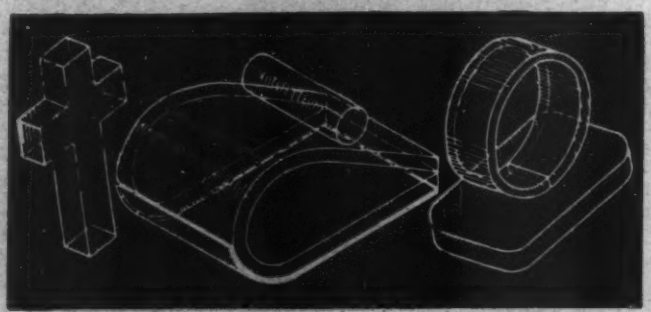

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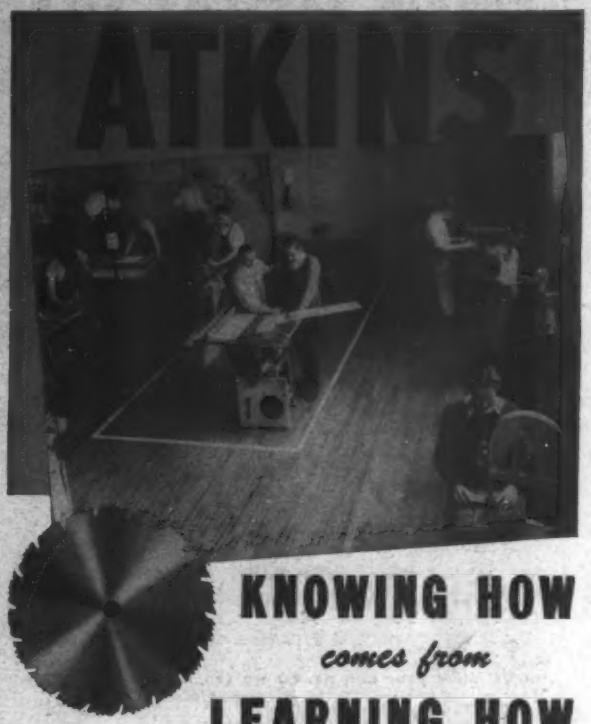

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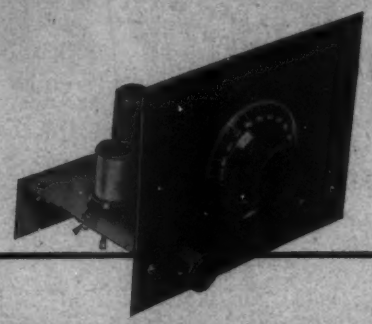

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936 NORTH MICHIGAN AVENUE, CHICAGO 11, ILLINOIS

(Continued from page 34A)

"Safety in the Home," "In Case of Fire," "Traffic Safety," "Bicycle Safety," and others. The film strips of the *Coronet* picture stories will be accompanied by reprints for use as manuals. The safety subjects will be accompanied by special manuals, prepared by the National Safety Council.

MARCH OF DIMES

The lovely little girl below is Nancy Shirleen Drury, of Louisville, Ky., who was chosen from hundreds of former polio victims who have been helped back to normal life by the March of Dimes, to be the Poster Girl for the 1947 March of Dimes which will be held January 15–30. Nancy, who will be five on March 31, was stricken in 1944 and, through hot pack treatments and muscle re-education, has progressed until now it is hard to tell she was once a victim of the dread crippler. She is scheduled to make a tour in the interests of the 1947 March of Dimes in January.

Nancy Shirleen Drury

New Publications

Aeronautical Drafting Manual

Prepared and published by Society of Automotive Engineers, Inc., 29 West 39th Street, New York City. Manual without binder, $2.50 per copy; for 10 or more copies, $2.25 per copy. With binder, $4.50 per copy; for 10 or more copies with binders, $4 per copy. 130 pp., 8½ by 11 in.

This book is an effort to establish a standardized drafting practice in the aeronautical industry. The material contained in it attempts to unify the methods of expressing and interpreting drawings among aircraft engine, accessory, and propeller manufacturers and the air lines.

It is divided into 13 sections which present the subject under the following headings: preparation of drawings, dimensioning by the decimal system, notes, abbreviations and symbols, definitions, threads, gears, splines and serrations, forgings, finish marks and special finishes, springs, and useful tables.

Improving Instruction in Industrial Arts

Paper cover, 96 pp., 6 by 9 in., 25 cents per copy; five copies for $1. American Vocational Association, Inc., 1010 Vermont Ave. N.W., Washington 5, D. C.

This is a revision of the well-known A.V.A. Bulletin on Standards of Attainment in Industrial-Arts Teaching.

The bulletin has been thoroughly revised and brought up to date. The list of learning units has been expanded, and the objectives of industrial arts will be found exceedingly helpful and enlightening by those who use the booklet.

The final chapter explains how to organize industrial-arts work so that its objectives are actually attained. It also shows how to analyze course materials, presents lesson plans, and presents some examples of bulletin-board charts.

Principles of Tool Engineering

By Raymond R. Bloom. Cloth, 234 pp., 6 by 9 in., illus., $2.40. The McGraw-Hill Book Co., New York City.

An excellent book for the learner who wants to become acquainted with the methods used in interchangeable manufacturing.

Stress is laid on the proper dimensioning of tool drawings, and there are chapters devoted to fixtures for the milling machines, methods of locating and clamping, drill jigs, and jig bushings, methods of inspection, and gauges.

The book also contains 20 problems on tool engineering and a list of visual aids.

Changing Your Work

By J. Gustav White. Cloth, 210 pp., 5⅓ by 8¼ in., $2.50. Association Press, 347 Madison Ave., New York City.

An interesting book for those, who, because of circumstances or dissatisfaction, have to or want to change their work. It contains a large number of illuminating examples of occupational and personal adjustments and is good reading, if for no other reason than to check up on one's own peculiar quirks. For those who actually are contemplating a change in their work it should prove very helpful.

Units in Hand Woodworking

By J. H. Douglass and R. H. Roberts. Paper

(Continued on page 39A)

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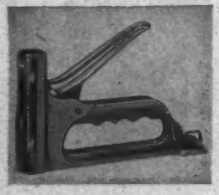

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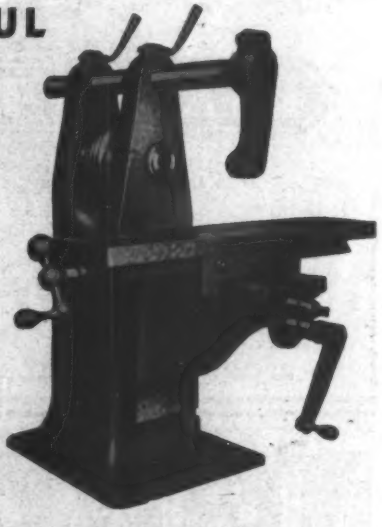

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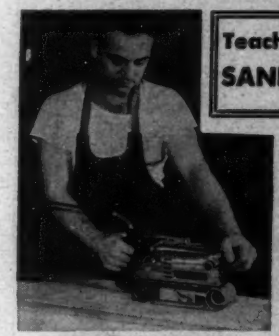

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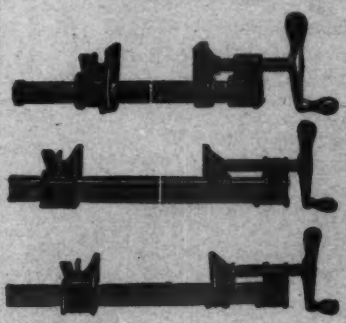

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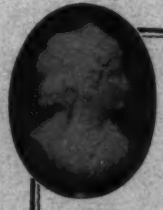

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(Continued from page 36A)

cover, 160 pp., 8 by 10¾ in., 60 cents. The McCormick-Mathers Publishing Co., Wichita, Kans.

A book containing information and operation units used by the classes in woodworking. Numerous illustrations accompany the descriptive material.

The subjects discussed in the information units embrace lumbering, classification, habitat, and characteristics of common woods, plywood; blueprint reading, layout tools; cutting tools; common wood joints; screws and nails; glueing; hardware; abrasives; stains, paints, enamels, and other finishes; wood fillers; shellac, varnishes, and lacquer; and care of brushes.

The operation units explain and illustrate how the various woodworking tools are used, how the various finishes are applied, and how simple upholstery and carpentry jobs are done.

Inspection Handbook for Manual Metal-Arc Welding

Paper cover, 156 pp., 6 by 9 in., illus., $1.50. The American Welding Society, 33 West 39th St., New York 18, N. Y.

A standard development during the war years, it outlines the duties of the welding inspector; acquaints him with the definitions of welding terms and the welding symbols; explains the arc-welding procedure specifications; enumerates the qualifications of welding operators; discusses the heat-treating operations, and the methods of testing welds and welded joints.

Educators Guide to Free Films

Compiled by Mary F. Horkheimer and John W. Diffor. Paper, 303 pp., 8¾ by 10¾ in., $4. Educators' Progress Service, Randolph, Wis.

This is the sixth annual revised edition of this very useful and handy guide. The *subject* index lists the films alphabetically, then under *film listings*. The films are classified by broad curricular areas, and full information is given on each individual film. Besides this there are the title index, the source index which gives the addresses of the nearest offices, and the cross index which refers to more films in closely related films.

The Rockefeller Foundation — Review for 1945

By Raymond B. Fosdick. Paper cover, 63 pp., 6 by 9 in., illus. Published by The Rockefeller Foundation, 49 West 49th St., New York City.

This report of the president of the Foundation is filled with very interesting statements and descriptions on the atomic bomb, the social sciences, our relations with Russia, the Foundation's work in the Far East, Brazil, and Egypt, the agricultural program in Mexico, animal husbandry in Iceland, psychiatry, work in Latin America, European refugee scholars, fellowships, and studies based on discoveries of the bones of ancient human beings.

Everybody's Handicraft Handbook

Paper cover, 155 pp., 8½ by 11 in., illus. $2. Published by Progress Press, 2153 Florida Ave., Washington, D. C., in co-operation with the Public Affairs Press.

This book starts out on a helpful note — how to improvise tools and materials. It covers woodworking, whittling, leathercraft, metalwork, plastics, clay modeling, puppets, braiding and knotting, celluloid etching, block printing, silk screen printing, poster design, lettering, cartooning, drawing, oil painting, water-color painting, mural painting, and photography.

International Business Dictionary

By Frank Gaynor. Cloth, 452 pp., 6½ by 9¼ in., $6. The Philosophical Library, New York, N. Y.

A valuable aid to those who have to translate English business terms into German, French, Spanish, or Italian.

The dictionary aids the translator in writing dates, geographic names, nationalities, money values, and weights and measures.

The book also contains German, French, Spanish, and Italian cross indexes.

Retooling America

Paper, 24 pp. War Assets Administration, Washington 25, D. C.

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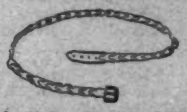

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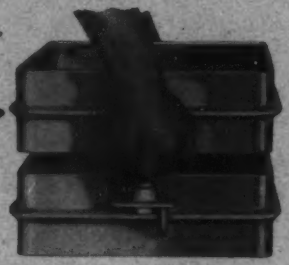

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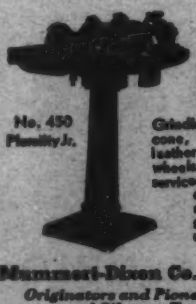

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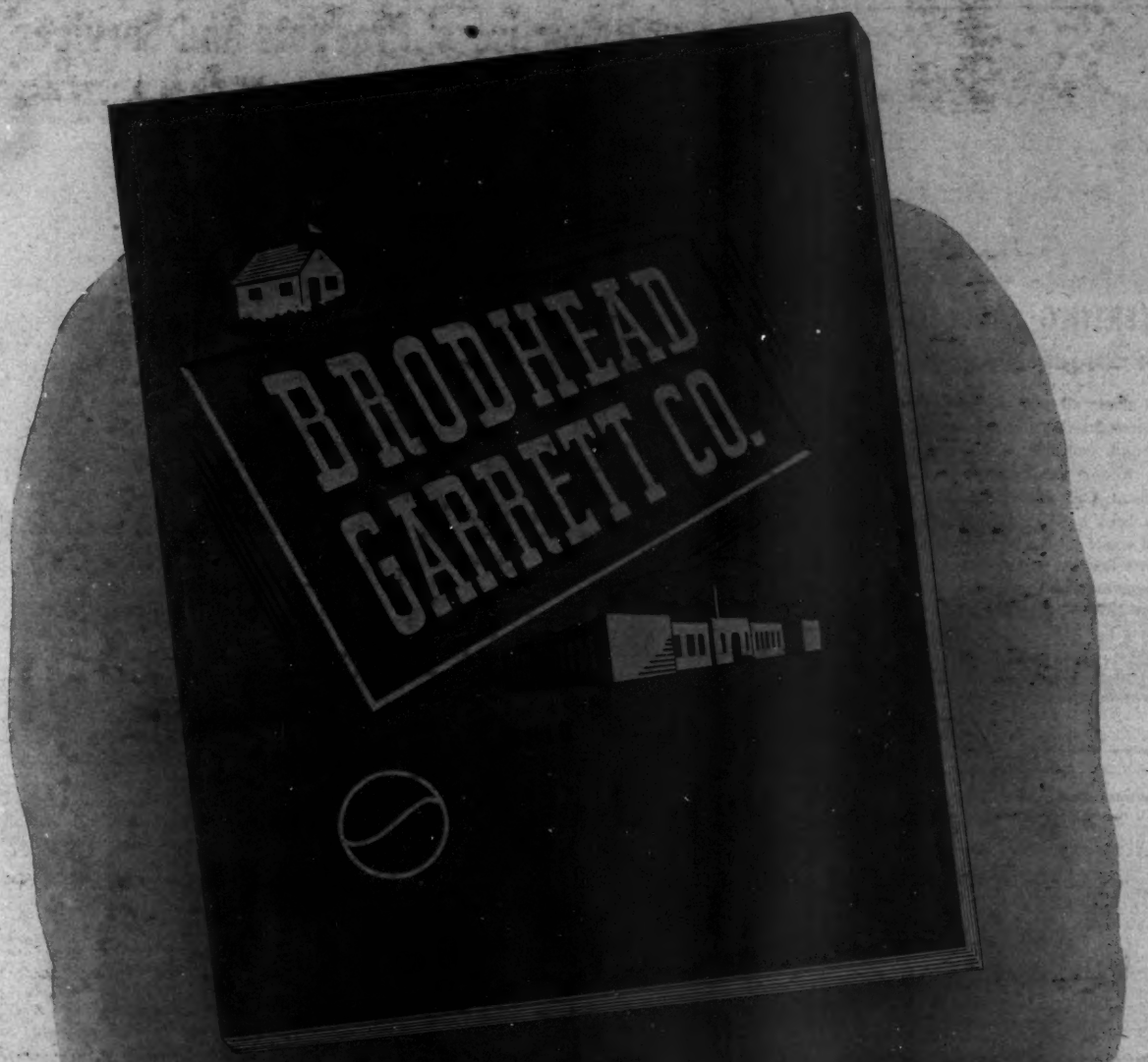

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